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OF THE

ROYAL AGRICULTURAL SOCIETY

OF ENGLAND.

VOLUME THE TWENTY-SECOND.

PRACTICE WITH SCIENCE.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1861.

THESE EXPERIMENTS, IT IS TRUE, ARE NOT EASY; STILL THEY ARE IN THE POWER OF EVERY THINKING HUSBANDMAN. HE WHO ACCOMPLISHES BUT ONE, OF HOWEVER LIMITED APPLICATION, AND TAKES CARE TO REPORT IT FAITHFULLY, ADVANCES THE SCIENCE, AND, CONSEQUENTLY, THE PRACTICE OF AGRICULTURE, AND ACQUIRES THEREBY A RIGHT TO THE GRATITUDE OF HIS FELLOWS, AND OF THOSE WHO COME AFTER. TO MAKE MANY SUCH IS BEYOND THE POWER OF MOST INDIVIDUALS, AND CANNOT BE EXPECTED. THE FIRST CARE OF ALL SOCIETIES FORMED FOR THE IMPROVEMENT OF OUR SCIENCE SHOULD BE TO PREPARE THE FORMS OF SUCH EXPERIMENTS, AND TO DISTRIBUTE THE EXECUTION OF THESE AMONG THEIR MEMBERS.

VON THAER, *Principles of Agriculture.*

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In Reprints of the Journal all Appendix matter (and in one instance an Article in the body of the Journal), which at the time had become obsolete, were omitted, the Roman numeral folios, however (for convenience of reference), being reprinted without alteration in the Appendix matter retained.

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THE WEATHER, PUBLIC HEALTH, PRICE OF PROVISIONS, &c., &c.,

FOR THE SIX MONTHS ENDING JUNE 30, 1861.

Chiefly extracted from the Quarterly Report of the Registrar-General.—The Corn Returns and Diagram are prepared from Official Documents expressly for this Journal.

ON

THE METEOROLOGY OF ENGLAND

DURING

THE QUARTER ENDING MARCH 31, 1861.

BY JAMES GLAISHER, ESQ., F.R.S.,

SEC. OF THE BRITISH METEOROLOGICAL SOCIETY.

THE rapid thaw which set in on December 30, 1860, continued only till the 1st of January, 1861, on which day the temperature rose to 47°; it fell to 28° by the morning of the 2nd.

From January 2nd the weather was cold; on the 6th, 8th, 9th, and 10th days the departures below their averages were 12°·4, 11°·0, 10°·4, and 14°·0 respectively, and the average daily deficiency to the 23rd day was 3°·7; a warm period set in on the 24th, and continued for the most part till the end of the quarter; the average daily excess for the 67 days ending March 31 was 3°·3. The cold of the first half of January this year was more rigorous than in any corresponding period since 1820.

The mean high day temperature in January was 3½° below, in February 3½° above, and in March 2¾° above, their respective averages of the preceding 20 years.

The mean low night temperature in January was 5° below, in February 3¾° above, and in March 1¾° above, their respective averages. Therefore, both the days and nights in January were extremely cold, especially at the beginning of the month; and in February and March both were warm.

The mean pressure of the atmosphere in January was a little above, and in February and March below, their respective averages of the past 20 years.

The temperature of the dew-point in January was 5°·3 below, and in February and March was 5°·0 above, their averages.

The fall of rain in January was 0·5 inch, in February 1·8 inch, and in March 2·2 inches. The sum for the three months was 4·5 inches, being 0·5 inch below the average.

The temperature of vegetation, as indicated by a thermometer placed on grass, was below 40° on 84 nights, and above 40° on 6 nights.

The mean temperature of the air at Greenwich for the three months ending February, constituting the three winter months, was 34°·0, being ½° below the average of the preceding 90 years.

THE WEATHER DURING THE QUARTER ENDING MARCH 31, 1861.

1861.	Temperature of									Elastic Force of Vapour.		Weight of Vapour in a Cubic Foot of Air.	
	Air.			Evaporation.		Dew Point.		Air—Daily Range.					
MONTHS.	Mean.	Diff from average of 90 years.	Diff. from average of 20 years.	Mean.	Diff. from average of 20 years	Mean.	Diff from average of 20 years.	Mean.	Diff. from average of 20 years	Mean.	Diff. from average of 20 years.	Mean.	Diff. from average of 20 years.
	°	°	°	°	°	°	°	°	°	in.	in.	grs.	gr.
January ..	33·9	-2·2	-4·4	32·5	-4·7	30·1	-5·3	10·9	+1·3	·168	-·037	1·9	-0·5
February ..	42·1	+2·9	+3·7	40·9	+4·1	39·4	+5·0	11·3	-0·1	·241	+·040	2·8	+0·5
March .	43·8	+2·9	+2·1	42·6	+3·3	41·2	+4·8	15·6	+0·9	·259	+·043	2·9	+0·4
Mean ..	39·9	+1·8	+0·5	38·7	+1·0	36·9	+1·5	12·6	+0·7	·223	+·015	2·5	+0·1

1861.	Degree of Humidity.		Reading of Barometer.		Weight of a Cubic Foot of Air.		Rain.		Temperature of Water of the Thames	Reading of Thermometer on Grass.				
										Number of Nights it was			Lowest Reading at Night.	Highest Reading at Night.
MONTHS.	Mean.	Diff from average of 20 years.	Mean.	Diff. from average of 20 years	Mean.	Diff from average of 20 years.	Amount.	Diff. from average of 46 years.		At or below 30°.	Between 30° and 40°.	Above 40°.		
			in.	in.	grs.	grs.	in.	in.	°				°	°
January ..	85	-4	30·011	+0·254	564	+11	0·5	-1·3	34·3	22	9	0	4·0	36·0
February ..	91	+6	29·686	-0·101	548	-6	1·8	+0·2	42·5	10	15	3	16·0	40·[illegible]
March .	90	+8	29·614	-0·179	545	-5	2·2	+0·6	44·4	13	15	3	16·7	40·7
Mean ..	89	+3	29·770	-0·009	552	0	Sum 4·5	Sum -0·5	Mean 40·4	Sum 45	Sum 39	Sum 6	Lowest 4·0	Highest 40·8

NOTE.—In reading this table it will be borne in mind that the sign (−) minus signifies below the average, and that the sign (+) plus signifies above the average

(IV)

ON

THE METEOROLOGY OF ENGLAND

DURING

THE QUARTER ENDING JUNE 30, 1861.

By JAMES GLAISHER, Esq., F.R.S.,

SEC. OF THE BRITISH METEOROLOGICAL SOCIETY.

The weather was cold till the middle of May, the mean daily temperatures of the air for the 44 days ending May 14th being 3° below the average for this period. The 15th and 16th of May were warm, followed by 3 cold days. From the 20th of May to the end of June the weather was generally warm; the average daily excess of temperature of the last 42 days was 1°.

In June the temperature reached 82° nearly; in the preceding June the highest point reached was 74°. On June 14th the mean temperature of the whole day was 67°, exceeding by 4½° that of the warmest day in the preceding year.

The mean high day temperature in April was 1¾°, in May 1°, and in June 0°·4 below their respective averages for the preceding 20 years.

The mean low night temperature in April was 2½° below, in May 1°·2 below, and in June 1°·1 above their respective averages for the preceding 20 years.

The mean temperature of April and May was a little below the average; that of June differed but very little from its average.

The mean temperature of the dew point in April was 0°·3 above, in May was 1°·9 below, and in June was 2°·3 above the average.

The mean pressure of the atmosphere in April exceeded its average by ¼ inch, in May by ⅙ inch, and in June differed but little from its average pressure.

The temperature of vegetation, as indicated by a thermometer placed on grass, was below 40° on 48 nights, and above 40° on 43 nights; the highest reading at night during the quarter was 55¼°, and the lowest 14°.

The fall of rain in April was 0·8 inch, in May was 1·8 inch, and in June was 1·9 inch. The total fall during the quarter was 4·5 inches, being 1·3 inch below the average of the preceding 46 years.

The mean temperature of the air at Greenwich for the three months ending May, constituting the three spring months, was 46°·7, being 0°·3 above the average of the preceding 90 years.

THE WEATHER DURING THE QUARTER ENDING JUNE 30, 1861.

1861. MONTHS.	Temperature of									Elastic Force of Vapour.		Weight of Vapour in a Cubic Foot of Air.	
	Air.			Evaporation.		Dew Point.		Air—Daily Range.					
	Mean.	Diff. from average of 90 years.	Diff from average of 20 years.	Mean.	Diff. from average of 20 years.	Mean.	Diff. from average of 20 years.	Mean.	Diff. from average of 20 years.	Mean.	Diff. from average of 20 years.	Mean.	Diff. from average of 20 years.
	°	°	°	°	°	°	°	°	°	in.	in.	grs.	gr.
April ..	44·3	−1·5	−2·0	42·4	−0·9	40·2	+0·3	19·0	+0·8	·249	+·002	2·9	0·0
May	51·9	−0·6	−0·9	47·8	−1·3	43·6	−1·9	20·5	+0·3	·284	−·016	3·2	−0·2
June ..	59·1	+1·0	−0·1	56·0	+1·2	53·1	+2·3	19·5	−1·5	·404	+·031	4·6	+0·4
Mean ..	51·8	−0·4	−1·0	48[illegible]	−0·3	45·6	+0·2	19·7	−0·1	·312	+·006	3·6	+0·1

1861. MONTHS.	Degree of Humidity.		Reading of Barometer.		Weight of a Cubic Foot of Air.		Rain.		Temperature of Water of the Thames.	Reading of Thermometer on Grass.				
										Number of Nights it was			Lowest Reading at Night.	Highest Reading at Night.
	Mean.	Diff. from average of 20 years.	Mean.	Diff from average of 20 years.	Mean.	Diff. from average of 20 years.	Amount.	Diff. from average of 46 years.		At or below 30°.	Between 30° and 40°.	Above 40°.		
			in.	in	grs.	grs.	in.	in.	°				°	°
April ..	85	+6	29·999	+0·264	551	+7	0·8	−1·0	48·9	19	11	0	14·0	39[illegible]
May	74	−2	29·924	+0·162	542	+4	1·8	−0·3	56·3	7	10	14	23·9	5[illegible]
June ..	81	+7	29·782	−0·011	531	0	1·9	0·0	62·8	0	1	29	35·5	5[illegible]
Mean ..	80	+4	29·902	+0·138	541	+4	Sum 4·5	Sum −1·3	Mean 56·0	Sum 26	Sum 22	Sum 43	Lowest 14·0	Highest 55·2

NOTE.—In reading this table it will be borne in mind that the sign (−) minus signifies below the average, and that the sign (+) plus signifies above the average.

[illegible]TE OF THE PUBLIC HEALTH.

1st Quarter.—121,713 deaths were registered in the quarter; this number was rather lower than the number of deaths in the winter quarter of the preceding year. The death-rate was 2·449; the average rate of the season being 2·480. The increase of the population in particular parts of the country is uncertain; but, assuming that the estimated rates of increase are tolerably correct, the mortality (2·671) in the town districts was (·017) above the average, whereas the mortality (2·235) in the country districts was (·018) below the average. As at the rate prevailing in the least unhealthy districts the deaths would have amounted to 88,864, the unnatural deaths may be set down as about 32,849, referable directly to the circumstances unfavourable to life in which the population is living.

2nd Quarter.—The number of deaths in this quarter was 107,721; in the same period of last year it was 110,878. The annual death-rate for the quarter was 215 to ten thousand persons living, whilst the average is 221. Both town and country populations have enjoyed a slightly improved degree of health: the rate of mortality in town being 228 per 10,000, against an average of 237; and that in the country 203 against 205. If the rate of mortality of the least unhealthy districts had prevailed throughout England, the total deaths would have been 85,823. Consequently 21,898 deaths may be deemed unnatural.

PRICE OF PROVISIONS.

1st Quarter.—The price of wheat was 55*s.* 1*d.* a quarter; and it exceeded by 10*s.* 8*d.*, or 24 per cent., the price in the previous winter quarter. The mean price of beef at the metropolitan markets was 5⅛*d.*; the inferior beef making 4*d.*, and the superior making 6½[illegible] a pound. The price of mutton was 6⅛*d.*, and ranged in the same way from 5½*d.* to 7¾*d.* a pound. The best potatoes were 147*s.* 6*d.* a ton.

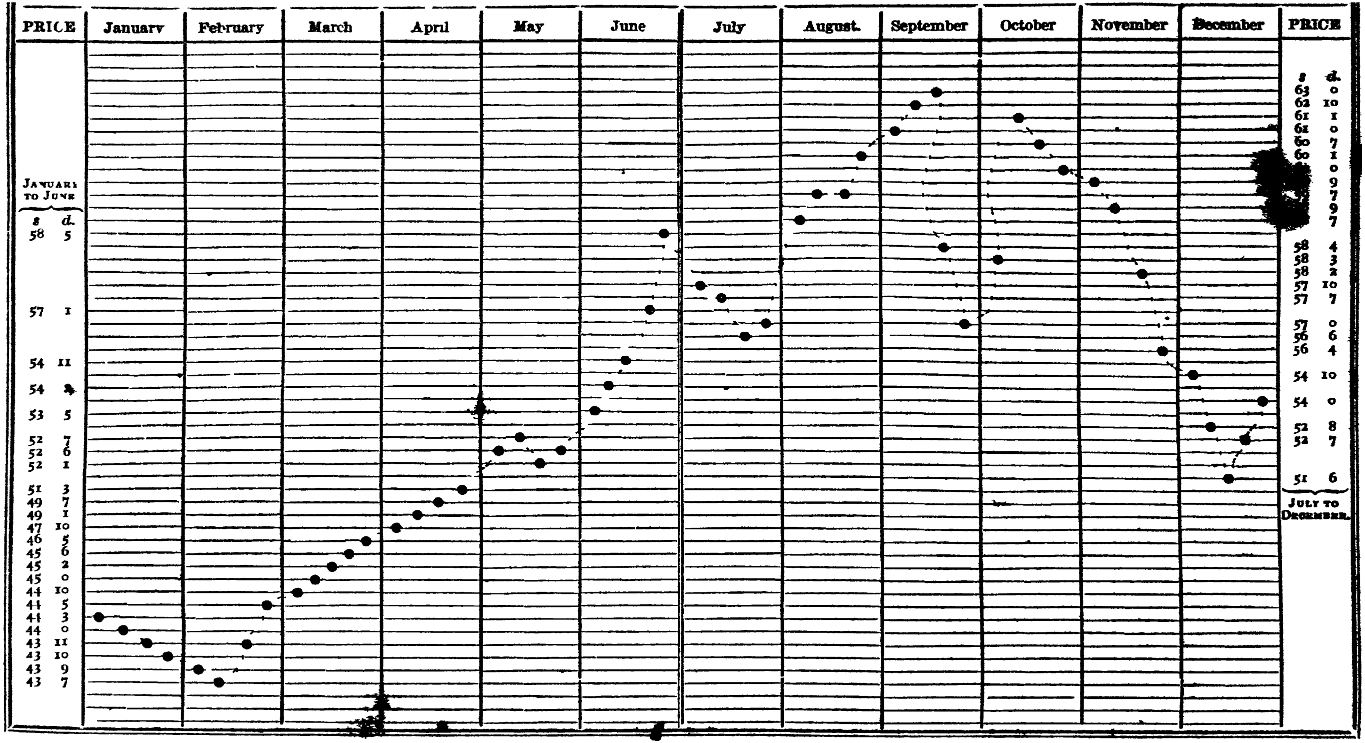
2nd Quarter.—The price of wheat was 54*s.* 9*d.* a quarter, and was higher by 2*s.* 1*d.* than in the previous June quarter, and by 7*s.* 6*d.* than in that of 1859. The mean price of beef in Leadenhall and Newgate markets was 5⅜*d.*; both highest and lowest prices were less than in the same quarter of 1860, which also held in respect of mutton, the mean price of which was 6¼*d.* Best potatoes averaged 130*s.* per ton, they were dearer than in the same quarter of 1859, cheaper than in that of 1860.

THE PRICE OF PROVISIONS.

The AVERAGE PRICES of Consols, of Wheat, Meat, and Potatoes; also the AVERAGE QUANTITY of Wheat sold and imported weekly, in each of the Nine Quarters ending June 30th, 1861.

Quarters ending	Average Price of Consols (for Money)	Average Price of Wheat per Quarter in England and Wales.	Wheat sold in the 290 Cities and Towns in England and Wales making Returns.*	Wheat and Wheat Flour entered for Home Consumption at Chief Ports of Great Britain.*	Average Prices of Meat per lb. at Leadenhall and Newgate Markets (by the Carcase). Beef.	Average Prices of Meat per lb. at Leadenhall and Newgate Markets (by the Carcase). Mutton.	Average Prices of Best Potatoes per Ton at Waterside Market, Southwark.
			Average number of Quarters weekly.	Average number of Quarters weekly.			
1859	£.	s. d.					
June 30	92⅞	47 3	96,514	99,533	4¾d.—6½d. Mean 5⅝d.	5d.—7d. Mean 6d.	85s.—110s. Mean 97s. 6d.
Sept. 30	95⅜	44 0	85,707	50,291	4¼d.—6¼d. Mean 5¼d.	4¾d.—6¾d. Mean 5¾d.	65s.—105s. Mean 85s.
Dec. 31	96⅛	43 4	127,361	44,911	4d.—6½d. Mean 5¼d.	4¾d.—6¾d. Mean 5¾d.	85s.—120s. Mean 102s.6d.
1860							
Mar. 31	94⅝	44 5	114,218	22,300	3¾d.—6½d. Mean 5⅛d.	4¾d.—6¾d. Mean 5¾d.	115s.—145s Mean 130s.
June 30	94⅞	52 8	101,106	62,272	4¾d.—6¾d. Mean 5¾d.	5½d.—7½d. Mean 6½d.	125s.—160s. Mean 142s.6d.
Sept. 30	93¼	59 1	66,539	139,142	4¼d.—7d. Mean 5⅝d.	5¼d.—7½d Mean 6⅜d.	125s.—145s. Mean 135s.
Dec. 31	93¼	56 9	73,770	197,396	3½d.—6¼d. Mean 4⅞d.	4¾d.—6¾d. Mean 5¼d.	115s.—130s. Mean 122s.6d.
1861							
Mar. 31	91¾	55 1	69,588	[illegible],880	4d.—6¼d. Mean 5⅛d.	5½d.—7¾d. Mean 6⅝d.	140s.—155s. Mean 147s.6d.
June 30	91¾	54 9	65,176	134,085	4¼d.—6½d. Mean 5⅜d.	5¼d.—7¼d. Mean 6¼d.	120s —140s. Mean 130s.
Col.	1	2	3	4	5	6	7

* NOTE.—The total number of quarters of wheat sold in England and Wales for the 13 weeks nding June 30th, 1859, was 1,254,682; for the 13 weeks ending September 30th, 1859, ,114,191; for the quarter ending December 31st, 1859 (14 weeks), 1,783,050; for the 13 veeks ending March 31st, 1860, 1,484,837; for the 13 weeks ending June 30th, 1860, 1,314,386; or the 13 weeks ending September 30th, 1860, 865,007; for the 13 weeks ending December 31st, 860, 959,006; for the 13 weeks ending March 31st, 1861, 904,649; and for the 13 weeks nding June 30th, 1861, 847,285. The total number of quarters entered for Home Consumption as respectively, 1,293,925; 653,789; 583,848; 289,906; 809,535; 1,808,848; 2,566,145; ,896,435; and 1,743,100.


PRICE
January
February
March
April
May
June
July
August.
September
October
November
December
PRICE
January to June
s d.
58 5
57 1
54 11
54 4
53 5
52 7
52 6
52 1
51 3
49 7
49 1
47 10
46 5
45 6
45 2
45 0
44 10
44 5
44 3
44 0
43 11
43 10
43 9
43 7
s d.
63 0
62 10
61 1
61 0
60 7
60 1
0
9
7
9
7
58 4
58 3
58 2
57 10
57 7
57 0
56 6
56 4
54 10
54 0
52 8
52 7
51 6
July to December.
WHEAT
BARLEY
OATS
BEANS
PEAS
MAIZE
FLOUR AND MEAL.

STATISTICS

THE WEATHER, PUBLIC HEALTH, PRICE OF PROVISIONS, &c., &c.,

FOR THE SIX MONTHS ENDING DECEMBER 31, 1861.

Chiefly extracted from the Quarterly Report of the Registrar-General.—The Corn Returns are prepared from Official Documents expressly for this Journal.

ON

THE METEOROLOGY OF ENGLAND

DURING

THE QUARTER ENDING SEPTEMBER 30, 1861.

By JAMES GLAISHER, Esq., F.R.S.,

SEC. OF THE BRITISH METEOROLOGICAL SOCIETY.

Till the 3rd day of August the temperature of the air was generally a little below the average; a warm period set in on August 4th, and continued till September 11th; from September 12th to September 27th the weather for the most part was cold, and warm from September 28th till the end of the quarter. In July the day of highest mean temperature reached 63°·7 only. , On August 12th it was as high as 72°·9, being nearly 12° in excess of the average. On July 12th the highest temperature reached was 76°·9; on August 12th it was 89½°. On September 30 the temperature rose to 74°, the mean for the day being 61°·5, the only instance, as far back as 1814, in which the mean temperature of the last day of September has been as high as 60°.

The mean high day temperature in July was 1½° below its average. In August it was 3°, and in September 1° above their respective averages of the preceding 20 years.

The mean low night temperature in July was ¼° above, in August ½° above, and in September ¾° below their respective averages.

The mean temperature of the air was 1° below in July, nearly 2° above in August, ¼° in excess in September, as compared with the average of the preceding 20 years.

The mean temperature of the dew-point was ¼° below in July, was 1° above in August, and was ½° below in September, their respective averages.

The mean pressure of the atmosphere was nearly 2-10ths of an inch in defect in July, was 1-10th in excess in August, and was 1-10th in defect in September, from the average of the preceding 20 years.

The fall of rain in July was 2¼ inches, in August little more than ½ an inch, and in September was 1½ inch. The total fall during the quarter was 4¼ inches, being 3¼ inches below the average of the preceding 46 years. At Rose Hill, near Oxford, on July 25th, there was a remarkably heavy rain, the fall being 2·9 inches in about 8 hours.

The temperature of vegetation, as indicated by a thermometer placed on grass, was below 40° on 12 nights, and above 40° on 82 nights.

The mean temperature of the air at Greenwich for the three months ending August, constituting the three summer months, was 61°·0, being 1°·0 above the average of the preceding 90 years.

The Weather during the Quarter ending September 30, 1861.

1861.	Temperature of									Elastic Force of Vapour.		Weight of Vapour in a Cubic Foot of Air.	
	Air.			Evaporation.		Dew Point.		Air—Daily Range.					
Months.	Mean.	Diff. from average of 90 years.	Diff. from average of 20 years.	Mean.	Diff. from average of 20 years.	Mean.	Diff from average of 20 years.	Mean.	Diff. from average of 20 years.	Mean.	Diff. from average of 20 years.	Mean.	Diff. from average of 20 years.
	°	°	°	°	°	°	°	°	°	in.	in.	grs.	gr.
July	60·9	-0·5	-1·0	57·1	-0·5	53·7	-0·2	18·9	-1·7	·413	-·004	4·6	0·0
August ..	63·2	+2·5	+1·9	58·9	+1·4	55·2	+1·1	21·8	+2·4	·436	+·014	4·9	+0·2
September	57·1	+0·7	+0·2	53·8	-0·1	50·7	-0·4	20·1	+1·6	·370	-·012	4·1	-0·1
Mean ..	60·4	+0·9	+0·4	56·6	+0·3	53·2	+0·2	20·3	+0·8	·406	-·001	4·5	0·0

1861.	Degree of Humidity.		Reading of Barometer.		Weight of a Cubic Foot of Air.		Rain.		Temperature of Water of the Thames.	Reading of Thermometer on Grass.				
										Number of Nights it was			Lowest Reading at Night.	Highest Reading at Night.
Months.	Mean.	Diff from average of 20 years.	Mean.	Diff. from average of 20 years.	Mean.	Diff from average of 20 years.	Amount.	Diff. from average of 46 years.		At or below 30°.	Between 30° and 40°.	Above 40°.		
			in.	in.	grs.	grs.	in.	in.	°				°	°
July	78	+2	29·606	-0·198	526	-2	2·2	-0·5	65·5	0	0	31	42·0	57·0
August ..	76	-1	29·865	+0·077	528	0	0·6	-1·8	65·6	0	3	28	39·7	55·0
September	79	-2	29·717	-0·012	532	-2	1·5	-1·0	61·9	0	9	21	31·8	56·3
Mean ..	78	-0·3	29·729	-0·078	529	-1	Sum 4·3	Sum -3·3	Mean 64·3	Sum 0	Sum 12	Sum 80	Lowest 31·8	Highest 57·0

Note.—In reading this table it will be borne in mind that the sign (−) minus signifies below the average, and that the sign (+) plus signifies above the average.

ON THE METEOROLOGY OF ENGLAND DURING THE QUARTER ENDING DECEMBER 31, 1861.

BY JAMES GLAISHER, ESQ., F.R.S.,
SEC. OF THE BRITISH METEOROLOGICAL SOCIETY.

THE warm period which set in on the 28th of September continued till the end of October. The mean temperature of this month was 54°·9, being in excess of the average of 90 years by 5°·4, of 43 years by 5°·0, and of the preceding 20 years by 4°·7. A marked change took place on the 1st of November, and the temperature till the 24th was, with the exception of the 5th and 6th, always below the average. On the 25th another great change took place from low to high temperature. This warm period continued to the 24th of December, the average daily excess being 3¾°: from Christmas Day to the end of the year was cold, exhibiting a deficiency of temperature to the amount of 3½° daily.

The mean high day temperature in October was 5¾° in excess, in November was 2° in defect, and in December was 1° in excess of their respective averages.

The mean low night temperature in October was 4° in excess, in November was 3½° in defect, and in December ½° in excess of their averages.

The mean temperature of the air was 4¾° in excess in October, 2½° in defect in November, and 1° in excess in December, as compared with the averages of the preceding 20 years.

The mean temperature of the dew-point was 5°·4 above in October, 3° below in November, and 0°·4 above in December, their respective averages. The mean for the quarter was 0°·9 in excess, therefore the amount of water mixed with the air was greater than usual.

The mean pressure of the atmosphere was a little in excess in October and December, and in defect in November, but upon the quarter it differed very little from its average value.

The fall of rain in October was 0·9 inch, in November 5·2 inches, and in December 1·3 inch. The total fall for the quarter was 7·4 inches, being about ½ of an inch more than the average. The fall in November was the greatest in this month for 45 years, with one exception, viz., in 1853, when the amount of rain was 6 inches. The total fall of rain for the year on the ground is 20·8 inches.

The mean temperature of the air at Greenwich for the three months ending November, constituting the three autumn months, was 50°·9, being 1°·5 above the average of the preceding 90 years.

THE WEATHER DURING THE QUARTER ENDING DECEMBER 31, 1861.

1861. MONTHS.	Temperature of — Air. — Mean.	Air. — Diff. from average of 90 years.	Air. — Diff from average of 20 years.	Evaporation. — Mean.	Evaporation. — Diff. from average of 20 years.	Dew Point. — Mean.	Dew Point. — Diff. from average of 20 years.	Air—Daily Range. — Mean.	Air—Daily Range. — Diff. from average of 20 years.	Elastic Force of Vapour. — Mean.	Elastic Force of Vapour. — Diff. from average of 20 years.	Weight of Vapour in a Cubic Foot of Air. — Mean.	Weight of Vapour in a Cubic Foot of Air. — Diff. from average of 20 years.
	°	°	°	°	°	°	°	°	°	in.	in.	grs.	gr.
October ..	54·9	+5·4	+4·7	53·1	+4·9	51·4	+5·4	16·4	+1·8	·379	+·067	4·2	+0·7
November	40·8	−1·6	−2·6	39·2	−2·6	37·1	−3·0	13·2	+1·6	·221	−·034	2·6	−0·2
December	41·0	+2·1	+0·9	39·4	+0·8	37·3	+0·4	9·9	+0·4	·223	+·002	2·6	+0·1
Mean ..	45·5	+2·0	+1·0	43·9	+1·0	41·9	+0·9	13·2	+1·3	·274	+·012	3·1	+0·2

1861. MONTHS.	Degree of Humidity. — Mean.	Degree of Humidity. — Diff. from average of 20 years.	Reading of Barometer. — Mean.	Reading of Barometer. — Diff from average of 20 years.	Weight of a Cubic Foot of Air. — Mean.	Weight of a Cubic Foot of Air. — Diff. from average of 20 years.	Rain. — Amount.	Rain. — Diff. from average of 46 years.	Temperature of Water of the Thames.	Reading of Thermometer on Grass. — Number of Nights it was — At or below 30°.	Number of Nights it was — Between 30° and 40°.	Number of Nights it was — Above 40°.	Lowest Reading at Night.	Highest Reading at Night.
			in.	in	grs.	grs.	in.	in.	°				°	°
October ..	87	0	29·842	+0·152	536	−3	0·9	−1·9	57·8	0	8	23	30·3	52·4
November	87	−2	29·561	−0·195	547	0	5·2	+2·8	44·5	18	9	3	16·5	50·0
December	87	−2	29·974	+0·169	555	+3	1·3	−0·7	..	12	17	1	19·6	43·4
Mean ..	87	−1	29·792	+0·042	546	0	Sum 7·4	Sum +0·2	Mean ..	Sum 30	Sum 34	Sum 27	Lowest 16·5	Highest 52·4

NOTE.—In reading this table it will be borne in mind that the sign (−) minus signifies below the average, and that the sign (+) plus signifies above the average.

STATE OF THE PUBLIC HEALTH.

1st Quarter.—The number of deaths registered in the three months was 100,986, considerably more than in the same quarter of 1860, which was 86,423, but less than in that of 1859. And over England the fluctuation in the deaths was generally similar to that which is shown in the aggregate number. The annual rate of mortality did not rise quite to the average; for the former was 199 in 10,000 of the population, the latter is 202. In the cold September quarter of 1860 the rate was 171. The mortality in the country and small towns was 178, whereas that of the large towns was 221. The respective average rates are 176 and 235: whence it appears that in an equal number of the population (10,000) there were 43 deaths more in towns than in country; but the health of the former was better relatively to their own former experience, than that of the latter, for the mortality amongst the rural population slightly exceeded its average. In 10,000 persons the excess of deaths over those of the corresponding quarter of 1860, was 37 in towns, and 19 in the country.

2nd Quarter.—The total number of deaths registered this quarter was 104,917; it was not so great as in the same quarter of 1859, but greater than in that of 1860. The death-rate for England and Wales last quarter was 2·061 per cent. of the population, the average being 2·179. Within eleven December quarters the maximum has been 2·4; the minimum 1·995. The population that dwell in the larger towns suffered a death-rate of 2·3; that of country parishes and small towns a rate of 1·8, or rather more. The difference may be stated thus:—If the mortality of last quarter prevailed for a year, a proportion of the persons who inhabit towns, equal to five in a thousand, would die, who would survive the close of the year if their lot had been cast amongst a rural population. But relatively to the standard furnished by the experience of former years in each of the two classes, the urban population obtained, or, by the successful application of sanitary science, achieved a greater reduction of the mortality than that which was obtained in the rural districts. In the former, from an average of 2·5 the rate was reduced to 2·3; in the latter it fell from 1·9 to 1·8.

PRICE OF PROVISIONS.

1*st Quarter.*—The average price of wheat per quarter for the three months ending September 30, was 52*s.* 1*d.*, which is less by 7*s.* than it was in the corresponding quarter of the year 1860, but higher by 8*s.* than in that of 1859. Both beef and mutton were cheaper than they were in the same period of 1860: the mean price of beef in the metropolitan markets being ¼*d.*, of mutton ½*d.*, per pound lower. The average price per ton of the best potatoes at the Waterside Market, Southwark, was 97*s.* 6*d.*; being 37*s.* 6*d.* per ton cheaper than in the same quarter of 1860, and 12*s.* 6*d.* dearer than in that of 1859.

2*nd Quarter.*—The average price of wheat for the three months ending December 31, was 59*s.* 3*d.* per quarter; thus, it was dearer by 2*s.* 6*d.* a quarter than in the same period of the year 1860, and dearer by 16*s.* a quarter than in that of 1859. The means of the highest and the lowest weekly prices of mutton in Leadenhall and Newgate markets have not varied in the last three December quarters; but beef of the inferior quality was dearer by ½*d.* per lb. than in the corresponding quarter of 1860. The mean price of the best potatoes at the Waterside Market, Southwark, was 120*s.* per ton, being 2*s.* 6*d.* a ton less than in the corresponding period of 1860, and 17*s.* 6*d.* a ton dearer than in the same period of 1859.

THE PRICE OF PROVISIONS.

The AVERAGE PRICES of Consols, of Wheat, Meat, and Potatoes; also the AVERAGE QUANTITY of Wheat sold and imported weekly, in each of the Nine Quarters ending December 31st, 1861.

Quarters ending	Average Price of Consols (for Money)	Average Price of Wheat per Quarter in England and Wales	Wheat sold in the 290 Cities and Towns in England and Wales making Returns.*	Wheat and Wheat Flour entered for Home Consumption at Chief Ports of Great Britain.*	Average Prices of		
			Average number of Quarters weekly.		Meat per lb. at Leadenhall and Newgate Markets (by the Carcase).		Best Potatoes per Ton at Waterside Market, Southwark.
					Beef.	Mutton.	
1859	£.	s. d.					
Dec. 31	96⅛	43 4	127,361	44,911	4d.—6½d. Mean 5¼d.	4¾d.—6¾d. Mean 5¾d.	85s.—120s. Mean 102s.6d.
1860							
Mar. 31	94⅝	44 5	114,218	22,300	3¾d.—6½d. Mean 5⅛d.	4¾d—6¾d. Mean 5¾d.	115s.—145s. Mean 130s.
June 30	94⅞	52 8	101,106	62,272	4¾d.—6¾d. Mean 5¾d.	5½d—7½d. Mean 6½d.	125s.—160s. Mean 142s.6d.
Sept. 30	93½	59 1	66,539	139,142	4¼d—7d. Mean 5⅝d.	5¼d.—7½d. Mean 6⅛d.	125s.—145s. Mean 135s.
Dec. 31	93¼	56 9	73,770	197,396	3½d—6¼d. Mean 4⅞d.	4¾d.—6¾d. Mean 5¾d.	115s—130s. Mean 122s.6d.
1861							
Mar. 31	91¾	55 1	69,588	145,880	4d.—6¼d. Mean 5⅛d.	5½d.—7¾d. Mean 6⅝d.	140s.—155s. Mean 147s.6d.
June 30	91¾	54 9	65,176	134,085	4¼d.—6½d. Mean 5⅜d.	5¼d.—7¼d. Mean 6¼d.	120s.—140s. Mean 130s.
Sept. 30	91⅜	52 1	82,383	128,336	4¼d.—6½d. Mean 5⅜d.	4⅞d.—7d. Mean 5⅞d.	85s.—110s. Mean 97s. 6d.
Dec. 30	93⅜	59 3	112,809	121,480	4d.—6¼d. Mean 5⅛d.	4¾d.—6¾d. Mean 5¾d.	110s.—130s. Mean 120s.
Col.	1	2	3	4	5	6	7

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* NOTE.—The total number of quarters of wheat sold in England and Wales for the quarter ending December 31st, 1859 (14 weeks), was 1,783,050; for the 13 weeks ending March 31st, 1860, 1,484,837; for the 13 weeks ending June 30th, 1860, 1,314,386; for the 13 weeks ending September 30th, 1860, 865,007; for the 13 weeks ending December 31st, 1860, 959,006; for the 13 weeks ending March 31st, 1861, 904,649; for the 13 weeks ending June 30th, 1861, 847,285; for the 13 weeks ending September 30th, 1861, 1,070,985; and for the 13 weeks ending December 31st, 1861, 1,466,525. The total number of quarters entered for Home Consumption was respectively, 583,848; 289,906; 809,535; 1,808,848; 2,566,145; 1,896,435; 1,743,100; 1,668,374; and 1,579,241.

JOURNAL

OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

I.—*The Principles which regulate the Breeding of Farm-Stock.*

By HENRY TANNER, M.R.A.C., Professor of Agriculture and Rural Economy, Queen's College, Birmingham.

PRIZE ESSAY.

THE careful observer of nature has ample proof that her works are all carried out in accordance with fixed rules, and no one has better opportunities for securing this evidence than the agriculturist. A modification of circumstances may cause a variation in the results; still there is, throughout his experience, a thread of evidence which proves the existence of established laws. The importance of farm-stock is daily becoming more fully recognised, and truths applicable to the whole class can be traced out and determined most satisfactorily by attention to individual specimens. The variation in the feeding capabilities of different animals is a fact which needs not to be enlarged upon, for every farmer knows that whilst some animals are such good feeders that they pay by an increase of weight for all the food which they consume, others, for the purpose of fattening, would be dear as a gift. Assuming, then, that such a difference exists, I propose to show and explain, as briefly as possible, the rules which govern the results required and the system to be followed in putting them in practice.

It materially lessens our difficulty to know that in the breeding of all varieties of farm-stock—cattle, sheep, pigs, &c.—the results seem uniformly to follow the same fixed but simple laws. It is an old and approved maxim that "like produces like;" but this rule, though generally true, may be misapplied, when the error will be demonstrated by the contradictory evidence of practice and experience. If an animal is capable of transmitting any character to its offspring, it must possess that which it conveys, although at times qualities may predominate in the offspring which were almost latent in the parent. If, therefore, any quality or character is rendered hereditary, it must correspond with that inherent in the parent from which it descended. If, however, I breed from a female possessing certain qualities by a male distinguished by an opposite character, it is clear that the offspring cannot perpetuate *both* of these characteristics, and the result appears antagonistic to the maxim that "like produces like." This brings us at once to the consideration of one of the most important principles connected with breeding, namely, that although "like produces like" (for it can produce nothing else), still when the parents possess opposing qualities the preponderance is exercised by that one which possesses the hereditary tendency in the greatest strength. If, for instance, a cow having any special peculiarity of form is put to a bull having the opposite character, the offspring will assume the character of that parent which possessed the greatest hereditary powers in this respect, or, in other words, the greatest purity and unity of influence. If these hereditary powers are under our control, it is important to consider by what means they may be increased or diminished.

In breeding from a ram and ewe possessing a similarity of type, the produce of such an union will of necessity also possess the like character, but in a higher degree. Thus the result of breeding stock of similar character is that these peculiarities are not only perpetuated but intensified in the offspring. Provided that the parents possess similarity of type in any given particular every successive generation thus produced acquires an increase of hereditary force, by which we mean the power of imprinting its own stamp upon its progeny. But in like manner as this power accumulates when there is a similarity of character, so also does it diminish when the parents have opposite or antagonistic characters. Suppose that a well-bred ram, by careful breeding through several successive generations, has acquired strong and valuable hereditary powers (which, for illustration sake, we will represent in figures), say equal to 100. If this animal be put to a ewe of a totally different character, say having hereditary power equal to 60, the result would be that the offspring would still possess the same character as the ram because of his superior hereditary power; but the hereditary capability of the offspring would be reduced to say $100 - 60 = 40$. Supposing the offspring to be a ram, at a subsequent period both the sire and offspring may appear equally perfect in form and general character; but the power of hereditary transmission being so much greater in the sire than this offspring (in proportion of 100 to 40), the former would be far more valuable as a breeding animal, although the difference in the capabilities of the two would be entirely hidden or latent. If you breed from animals possessing a similarity of type, the offspring will possess the same character, but with a greater power for the hereditary transmission of this character. On the other hand, animals having opposite characters mutually weaken each other's influence, and the offspring only possess the power of hereditary transmission in a reduced degree.

This power of perpetuating character is not confined to any one quality, but it extends to every peculiarity of the animal, whether it be similarity of feature, configuration of the body, general habit of growth, disposition for fattening, the formation of milk, healthy constitution, predisposition to disease, temperament,—all are alike hereditary and are modified in their transmission by the mutual influence of the parents. It would appear as if every individual point of character were thus controlled and balanced according to the respective tendencies of the parents, and that the resultant character represented a series of balances, sometimes in favour of the male, at other times in favour of the female. The dam might succeed in communicating the general form to the body but be unable to overcome the stronger power of the male over some certain portion of the body. The dam might be naturally deficient, for instance, in her hind-quarters and good in other parts, and under the influence of a sire having a powerful tendency to produce a good hind-quarter she may be compelled to yield to his superior influence. In certain points of character, where they corresponded, the influence would be increased. In some particulars the dam might predominate, and in other respects the sire might be most influential. Thus the hereditary powers of carefully-bred stock will represent the maximum of good influences and a minimum of those which are undesirable.

In our wild animals we have natural laws operating whereby they are preserved from degeneracy. Thus their powers of vitality are preserved and constitutional disease reduced to its lowest point. Immediately the male has passed the prime of life and his natural vigour begins to diminish, he ceases to hold his position against younger males of more strength. Thus in the sanguinary conflicts amongst the male animals of wild species, in which the supremacy is contested, we see one means established by Nature for securing the perpetuation of the species to the strongest and most vigorous males. In like manner, those of unripe age, as well as those which are the subjects of disease, are held in check by those which are vigorous and healthy, and the consequence is that a strong constitution is secured to their offspring. By domestication we interfere with the action of these natural laws. We seek to establish and perpetuate certain peculiarities of the animal system which are unnatural, but which are, at the same time, very desirable for our comfort and prosperity. There are three special objects which the general breeder seeks to attain with a view to direct profit, each of which requires a special mode of procedure which cannot be departed from without loss. These qualifications are—

A liberal production of good milk;
An economical formation of meat;
And the preservation of purity of blood.

I shall endeavour to prove that we have these important points of character far more under our control than is generally imagined, and that from want of due consideration we often frustrate and impede our designs.

PRODUCTION OF MILK.

The milking character of our various kinds of stock takes a wide range even amongst females of the same class. Apart from the influence of food, we may remark that the quantity of milk secreted depends upon the supply of blood which the mammary glands receive as well as upon their activity, whilst its quality is mainly dependent upon the internal organism of the animal. We find, as a rule, that those domesticated animals which exist under circumstances most nearly approaching to a state of nature possess the greatest tendency to produce milk. The formation of milk is a provision of nature to supply food for the young offspring; it precedes the birth of the young animal, and is generally most abundant in those animals which breed most freely. If, however, by domestication we produce an animal possessing peculiar qualities which differ from the natural character of the dam in its wild condition, then the powers of reproduction are decreased and the energy of the system is also reduced for the formation of its accompanying product, milk. Although these two points of character—viz. a disposition to breed and an aptitude for the secretion of milk—usually increase and diminish similarly, yet there are good reasons for believing that, like other functions of the animal organism, we may materially increase the formation of milk even when the breeding-powers are naturally weak. In producing animals which differ materially from the type of the animal in its wild condition, we find that natural barriers present limits beyond which we cannot pass, and consequently by degrees we approximate to instances of barrenness in the offspring. To meet this difficulty we have to adopt measures for giving increased vigour to the system, or, as we commonly term it, to strengthen the constitution of the animal; but what are the measures adopted for this purpose other than allowing the natural habits of the animal to exert their legitimate influence? in fact, retracing some of the steps previously taken in excess.

The formation of milk we have more under control than the powers of reproduction; for when the mammary glands have been brought into a state of activity by the birth of a calf or other young animal, then the continuance of the flow will be influenced by the hereditary character of the parents as well as by judicious management. This hereditary influence must not be viewed as confined to the female, for I have not the slightest doubt on my mind that the constitution of the sire tells powerfully upon the offspring in this respect. A bull, the produce of a good milking family, has a tendency to convey this disposition to his offspring, and greatly to strengthen similar tendencies which may be hereditary on the side of the dam. On the other hand, the use of a bull descended from a bad milking-family leads to the rearing of a class of stock possessing less value for the production of milk. In too many cases bulls have been preserved for use in ordinary dairies simply because of their symmetry or tendency to fatten, without due consideration of the milking character of their ancestry. With regard to sheep also, I remember a very striking instance of the loss of milk in a flock (previously celebrated for their supply of milk) being traced entirely to the use of a very well-formed ram, bred from a ewe singularly deficient in milk. In this case all his stock to the second and third generations possessed or imparted this undesirable character. A large proportion of the losses in our flocks and much of the additional labour and expenses occasioned by ewes being short of milk may be traced to this cause. This deficiency of milk amongst our ewes is becoming a serious evil throughout the country: one, no doubt, which has accompanied the introduction of high-bred sheep—rather, let us hope, by oversight than as a necessary consequence. Amongst all classes of stock—cows, ewes, and sows—we find a great disposition for the accumulation of fat usually attended by a deficiency in the flow of milk; but there does not appear to be any reason why both of these points of character should not be combined in the same individual, as we shall subsequently consider more fully.

The quality of the milk bears an important relationship to the quantity which an animal produces. The richness of milk depends upon the quantity of the fatty matter present, which is more familiarly known as cream and butter. The general structure of the animal body, together with its mode of living, also appear to control the value of the product. For the production of a rich milk two qualifications are necessary in the animal.

The first step is to separate and prepare the fatty and nutritious elements of food, so as to introduce it into the circulation with as little loss as possible.

The second step is to separate a large proportion of these elements in the form of rich milk.

Any circumstance which causes a waste of the fatty and nutritive ingredients in the food necessarily causes the milk to be of inferior value. It is exactly the same with the formation and preservation of the fatty matter of the blood, whether its subsequent appropriation be as the fat of milk or the fat of the body; for that animal which can most economically convert the fat-producing matter of food into the fatty matter found in the blood has most successfully accomplished the first step. In the fattening of a bullock, as well as in the feeding of a milch cow, the fatty matter of the food has to be taken up into the blood, and it depends upon the organism of the animal whether it shall be subsequently deposited in the form of fat or excreted as the cream of milk. It is, however, evident that an economical preparation of the materials of the food is equally important for the formation of the fatty matter of the blood, whatever may be the form into which the animal system may convert it; and for this reason those animals which are best adapted for fattening are also best prepared to fulfil the first condition essential for the production of rich milk.

We have now to consider the influence of the animal system upon the rich fatty matter circulating in its blood. The formation of milk is primarily dependent upon the activity of the mammary glands, which are naturally excited to action a short time prior to the birth of the offspring. The energy of these glands is naturally superior to the tendency which the animal possesses for the formation of fat; so much so, indeed, that when the food is deficient in oily matter fat which has been already formed is sometimes taken up again into the circulation and separated by the mammary glands in the milk. Thus we find that when these glands are acting in a healthy and energetic manner, the fatty matter of the blood is freely separated by their agency, and we have a rich milk produced. In very many instances these glands have assumed an unnatural and torpid condition, have become less susceptible of the energy usually imparted by the birth of offspring, and have been influenced by it for a shorter period of time. In such cases, although the food may have been well prepared and the blood may travel through the vessels of the glands richly laden with the elements of milk, yet, from their torpidity, they may fail to appropriate it as milk, and the blood may pass on to yield its treasure to other parts of the body. Our great endeavour should therefore be to encourage a more active condition of these glands. These organs, in common with other parts of the system, are subject to hereditary influence, and much may be done in this direction to stimulate them to the performance of their natural functions, whilst a neglect of this agency will increase and perpetuate an evil which considerably reduces the value of much of our breeding-stock. Not only may we hope that by judicious management these organs may again be raised to their natural standard of efficiency, but, like other parts of the animal system, become even more highly developed under the fostering care of man. Instances are by no means rare in which we observe in happy combination an aptitude for the formation of fat with sufficient energy of the mammary glands to produce a liberal supply of milk. Generally, in the case of cows, those that produce butter freely are subsequently found profitable for feeding for the butcher. With ewes thus distinguished the lambs thrive without extraneous supplies of milk, and they are equally disposed for laying on fat when no longer intended for breeding. This combination is equally observable in sows of a like description, which produce large, healthy, thriving farrows, and make a good return for the food given them.

FORMATION OF MEAT.

When the object to be attained is the production of meat, many points require consideration. Much will depend upon the management and attention of the feeder, and in this respect it has been fully proved that it is essential for the economical production of meat that the animal should be kept in a thriving condition from its birth. Our attention, however, is here specially due to those consequences which result from the natural character of the animal. One of these is the capability of the dam to nourish her offspring, or, in other words, her power of producing a free supply of good milk, to which we have before adverted. Other points of character being equal, this capacity for the formation of milk will very powerfully influence the value of the dam for the purpose of rearing an animal especially intended as an economical producer of meat. Moreover, besides this supply of good milk after birth, we must not overlook the support given by the dam to the "fœtus in utero"—one that has many analogies and affinities to the yield of milk afforded to the young animal after its birth. A good milker will produce her offspring fatter, finer, and in better condition than a bad milker; whilst a puny calf tells us of a dam which has an overpowering disposition for the formation of fat. The importance of balancing these competitive tendencies so as to secure an adequate supply of milk is of primary importance for the economical breeding of animals intended to be producers of meat; whilst as this superior milking character is not generally possessed by high-bred stock, they would, by this rule, be set aside (in the majority of instances) as not being the best adapted for this object, and practice confirms this view. This capability of the dam to nourish and support the offspring should, of course, be accompanied by a well-formed and roomy body capable of affording the young suitable accommodation for their development and growth.

But the chief point we have here to regard is that the progeny should have, by nature and character, a special capacity for the economical production of meat, or, in fact, be good machines for changing vegetable productions of various kinds into animal matter. Here again the evidence of practice is very decided, as showing that our well-bred stock will produce more meat from a given quantity of food than those of inferior quality. I have shown in other communications* in what manner the system of management adopted and the peculiar conformation of the body which is possessed by all well-bred stock—whether cattle, sheep, or pigs—promotes the economical production of meat. It is enough for our present purpose to record the fact that the squareness of frame, the small proportion of offal, the docile disposition, and the smallness of the lungs possessed by all animals of this description are well calculated to favour the production of the largest quantity of meat of the best quality from any given quantity of food with the least loss in its conversion. These, therefore, are most important points of character to be imparted to any animal which is simply to be used as a means for producing a certain amount of animal food. For these reasons, the dam should be well-formed, healthy, and a good milker, and the young animal should receive from its parents that conformation of body and constitution which render our high-bred stock such economical producers of meat. These are, however, in some degree antagonistic requirements; for, as we have before seen, those animals which possess a strong tendency for the formation of fat are not generally remarkable for being good milkers: yet such a combination is desirable if it can be attained, and the two objects are not irreconcilable. Practically, there will be no difficulty in selecting a well-formed healthy female, capable of nourishing her progeny in a satisfactory manner, and we must endeavour to communicate to the offspring those necessary qualifications which are deficient in the female by means of the sire. To accomplish this result, a male should be selected which has been very carefully bred, and whose ancestry during several preceding generations has possessed those qualifications which distinguish well-bred stock as economical producers of meat.

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* 'Journal of Highland Agricultural Society,' No. LXIX., page 321. 'Journal of Bath and West of England Agricultural Society,' vol. vii. page 57.

Such a male, in consequence of such parentage, will have concentrated within him powers of transmitting this character to his stock proportioned to the length and purity of his pedigree. If this male were put to a female possessing hereditary powers of less powerful character, it is manifest that the male will have the greatest influence upon the offspring and impart to it a similar disposition for rapid feeding to that which it possessed. In this manner we can transmit from the male the predisposition to form meat economically, whilst in the female we have secured the means for bringing this character to the fullest and most vigorous development. The more fully these characters are possessed by the parents respectively, the more perfect will be the result. It is desirable that the female should not only be competent to produce and freely nourish her offspring, but also that she should not possess strong hereditary powers to oppose and counteract the influence of the male. The male should have the guarantee of a well-guarded pedigree for that unstained unity of character which by its concentrated energy is so influential upon the offspring.

Some may, however, anticipate that a similar result would be attained by breeding from a very well-bred female by means of an inferior male. This, however, would not be the case, and a moment's consideration will show the cause of this variation. In the former case we have a female capable of fully developing and nourishing her young, more certain as a breeder, more hardy in constitution, and consequently more free from the seeds of disease than in the latter. On economical grounds also the contrast is great, for by the one plan you require but one valuable and expensive male animal, whilst under the other system each of the females has to possess this pedigree value. We have therefore every inducement to breed from females well adapted to produce the finest offspring, and to use male animals capable of imparting those qualities which all will admit are desirable for the production of meat. This is no new principle, for it was advocated more than twenty years ago by the late Lord Spencer, who in the 1st volume of the Royal Agricultural Society's Journal has recorded his conviction that the worse bred the cow may be the more fully will the calf resemble the bull. An instance illustrating this principle came under my notice while I was inspecting one of the late Duke of Bedford's well-managed farms. I was very much struck with the superior quality of about 100 or 120 store pigs, as much alike as possible, and all admirable in form and condition. I expressed a wish to purchase some for breeding, but I was told, in a reply characterised alike by candour and sound judgment, "valuable as they are for feeding, they are worthless for breeding." Great as was my first surprise, no explanation was needed when I saw the parents. The boar was exceedingly well made, and very fine in quality, with a most careful pedigree, whilst the sows were large, coarse, and ugly, but excellent breeders and good milkers, thus producing large farrows and pushing them rapidly on towards maturity.

An interesting communication appears in the Journal of this Society (Vol. xiv., p. 214), from M. Malingré-Nouel, bearing upon this subject. He introduced into France some of our choicest English rams for the improvement of the native breeds of sheep, but the lambs obtained were in no way improved by their use. By long-continued breeding in and in the French ewes had hereditary tendencies far more powerful than those of the English rams, which rendered the influence of the latter quite inoperative. As soon, however, as some ewes were obtained by crossing different native breeds, the hereditary power became reduced to a very low degree, and the lambs subsequently produced by the English rams partook so closely of the character of the sires that they were considered by good English judges to have been pure-bred sheep from England.

For the economical production of beef the best stock will be obtained from good useful dairy cows by the use of bulls of thoroughly good pedigree. Indeed, I may observe that a bull can scarcely be too well bred or too good for such a purpose, provided that the natural vigour of the system be not sacrificed. The quality and influence of a bull determines the value of a large number of bullocks, and it becomes a matter of considerable importance to the breeder thus to impart to these a superior feeding character. When this influence is fully appreciated we shall not find bulls valued as so much beef, but rather as the communicators of certain feeding qualities which will render their numerous offspring either profitable or unprofitable to the grazier. In the case of sheep, a good supply of milk materially affects the value of the lambs; and too much care cannot be taken to preserve and encourage this excellent disposition. Combined with this the ewes should also possess hardy constitutions, and thus be capable of rearing healthy and thriving lambs. The ram should regulate the increase of quality, which must be discreetly governed by the local peculiarities of climate. The parentage of the ram should be investigated with equal if not greater care than his symmetry and general quality.

There is no variation from these rules even in the breeding of pigs. Here let the boar be distinguished by good quality and careful breeding, and the sow able to rear a numerous progeny to a high degree of perfection. Thus will a class of stock be produced eminently adapted for the economical production of meat.

PURITY OF BREED.

The production of animals for maintaining and perpetuating the pure breeds is a course of practice distinct from either of the preceding systems which we have noticed. In these the production of milk and meat respectively modified and regulated our proceedings, but for the present purpose we have to produce fixity of type, and to this end we must select animals possessing the same characteristics and the same affinities, that in each succeeding generation the same stamp may be the more deeply and indelibly impressed upon the offspring. When there is any bad point of character to be overcome it is only to be accomplished by persevering in the use of a parent having, if possible, an opposite tendency, or at least as little as may be of that which is objectionable, by which means the evil, if not subdued in the first generation, will be gradually corrected by judgment and perseverance. The subsequent course of procedure will aim at rendering the character thus acquired as permanent as possible. Every generation will have the special character of the breed more and more powerfully concentrated, and consequently will be more competent to render these qualities hereditary. We have before seen that the influence of the parent upon the offspring is dependent upon the relative powers possessed by each individual. In the case of pure-bred animals there should be no opposing influence to weaken the hereditary tendencies of the offspring, but on the other hand a concurrent and sympathetic nature, so that the hereditary character may be confirmed and strengthened. Anything like a cross should be most jealously guarded against as introducing a conflict of influences, which impairs the character of the race.

It may, however, be said that if we do not get fresh blood we lose size in our stock. This sacrifice is greater in appearance than in reality, for presuming the opinion to be correct that the food consumed by animals of equal quality bears a regular proportion to their live weight, and there is good reason to believe that such is the case, then it is clear that the loss of size does not render the consumption of food less economical. This diminished size does not appear in any way to prejudice the stock produced when such sires are used with females of inferior quality having a good supply of milk. If we could breed in the same line and yet not lose size, it would be decidedly advantageous. This is a difficulty which the producer of pure breeding stock has to combat to the best of his judgment and discretion; but on no condition should size be gained by any stain in the pedigree. It were better to allow the diminished size to continue, for to maintain it at the cost of pure descent would be to sacrifice the main object in view. To meet any drawbacks attendant upon this maintenance of purity of breed, this stock should bear such a value, and bring such remunerative prices to the breeder, as to indemnify him against risk and losses, and open a fair prospect of profit. The decrease of size may, like every other point of character, be influenced by discretion in the management. An instance occurs to my mind of a celebrated breeder of sheep who was noted for maintaining size with great purity of descent. He made an invariable rule of purchasing his rams from a most carefully bred flock, and for twenty-two or twenty-three years—in fact, up to the time when he gave up business—he never introduced any other blood, but he was exceedingly particular in selecting the largest rams, being satisfied that whether large or small all possessed an equally pure pedigree. His extended experience thoroughly convinced him that his system was correct.

It has been judiciously remarked that it is much easier to bring any breed to the highest state of perfection than afterwards to maintain it in that position. The difficulties are undoubtedly great, but observation shows that they are not insurmountable. The relative advantages of breeding in and in and breeding in the line have scarcely been determined, but it is a subject worthy of consideration. Mr. Pawlett, a ram breeder of high repute, and the author of an Essay on Sheep,* says :—

> "From a long experience and close attention to the subject for more than twenty years, my mind seems more disposed to favour breeding in and in, rather than changing from one flock to another. I do not recommend that animals closely allied should be put together generally, yet I have known a very good sheep, for instance, produced by putting the son of a ram called A to a daughter of A in cases where their points would suit each other, and I should never hesitate to do so."

Mr. Robert Smith, whose reputation as a ram breeder is equal to that of Mr. Pawlett, and who is the author of the Prize Essay on Sheep,† takes a very different view of this question, and says :—

> "With crossing and breeding in and in I have been lamentably disappointed, there being no dependance on the first, and no size to be procured in the latter. Even in 'breeding in the line' much depends upon the union or knowledge of matching the male and female, particularly if selected from different families even of the same race, which have been for some time raised in other localities, and consequently influenced by climate, soil, situation, and treatment. When using rams of the same flock they should by no means be used nearer than a *third* remove in the same line of blood. I have, by repeated experiments, experienced by the nearer affinities of blood the most decided disappointment, but have raised some first-rate animals by putting together the third removes when attention had been previously paid to the sort required."

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* 'Journal of the Royal Agricultural Society,' vol. vi. page 362.

† Ibid., vol. viii. p. 25.

In the former case the ram A stands in the relationship of *sire* to the two sheep to be bred together; in the latter case he stands as *grandsire* to both. In this way, by *diverging* from a favourite sheep, we again converge, and probably produce one or more sheep of the utmost value to that flock, as presenting some distance in relationship without any sacrifice of family merit.

With all the advantages derivable from breeding stock with good pedigree and great fixity of character, we find that not only are good qualities thus concentrated and rendered hereditary, but also others of less desirable character which may have been possessed by the parents. Thus we have in many cases a delicacy of constitution and a want of energy in the system, which is too commonly looked upon as a necessary result of high breeding, but I am inclined to believe that these results are much more referable to the system of management pursued. The delicacy imparted to stock by too much protection through the winter months in warm sheds and buildings, whereby they get glossy coats, ill prepared to resist atmospheric influences when they are turned out to grass in the spring, render such stock peculiarly delicate. This delicacy, when continued for several successive generations, becomes constitutional and hereditary. A moderate exposure to the cold of winter and plenty of exercise will enable cattle of the purest breed to keep a good rough coat, and although they may need more food, still this is a sacrifice perfectly insignificant in comparison to the advantages gained by strengthening and invigorating the system, instead of fostering a relaxed and enervated condition of body. Well-bred cattle reared in this hardy manner possess far more vigorous systems, and it should be remembered that whilst we concentrate in our stock valuable powers of hereditary transmission, these only become available in proportion as we preserve in them that vigour of health which will enable them to communicate these influences. The capability of stock for breeding is much reduced by the enfeebled condition of the body induced by rendering them delicate. This unfavourable influence is seriously increased by the general course of management now adopted, and the evil accumulates in a greater degree with every successive generation. An excessive quantity of fat in either of the parents is also unfavourable to the exercise of the breeding powers. These, however, are matters of detail which should rather be noticed under the general management of stock, but I have made reference to them because it is essential that breeding animals should not only possess certain points of character which are desirable for transmission to their offspring, but that they should also be in that vigorous state of health which will enable them to produce healthy descendants. It is no uncommon circumstance for well-bred stock to be drafted from the herd as incapable of breeding, which, when put to males of inferior breed, are found to be prolific. Much of this, doubtless, arises from a want of vigour of body induced by a debilitating course of treatment which would have been prevented by active exercise and a system of management calculated to promote health.

The accumulation of those hereditary tendencies which are most suitable for the circumstances of each individual case is in a great measure under our control, but it must still be looked upon as only one portion of a general system rather than as embodying all that is necessary. It is an important adjunct to other points of good management which are of great value to the breeder if judiciously employed, but at the same time all his efforts in this direction will be of no avail unless assisted by his general course of management. Valuable as a good pedigree may be when combined with a healthy and vigorous body, when the latter is sacrificed to attain the former, the value of pedigree is questionable. By avoiding excessive fatness in our breeding animals, by encouraging exercise and moderate exposure so as to favour the health and energy of the body, and by giving a liberal but regularly progressive supply of food, we shall best prepare our stock for being recipients of those hereditary powers to which I have here made reference.

II.—*Adulteration of Seeds.* By Messrs. WILLIAM and HUGH RAYNBIRD, of Basingstoke.

PRIZE ESSAY.

THE growth and sale of pure, sound, clean seed of agricultural plants at a moderate price is of the greatest importance, and the object of the prize offered by the Royal Agricultural Society is doubtless to promote these ends by enabling the buyer to detect and therefore to check defects in cultivation or abuses from adulteration. None are so competent to furnish information on this subject as seed-dealers, who have constantly samples of all kinds of seeds offered to their inspection; but they may possibly be deterred by the fear of two very illiberal objections—first, that a knowledge of the secrets of adulteration could only be obtained by some participation in the practice, and secondly, that it is wrong to divulge to the public anything that may be considered a trade secret. The author, being himself a seed-dealer, may be allowed to reply to the first that his knowledge extends no further than that of every respectable dealer; and to the second, that as the dealer in seeds is, properly speaking, only a medium between the grower and the farmer who requires seeds, his agency, fairly conducted, has no secrets to conceal from the public.

It is, however, of great importance to the fair dealer that attempts at imposition should be detected and exposed, because whilst such devices prosper it is impossible for him to compete in *prices* with the trickster.

It is of still more importance to the agricultural public that they should recognise the two following truths :—

1st. That goods offered below the current market-price must, as a rule, be either of inferior stock, damaged, or adulterated, because one seed-dealer has no peculiar advantages over another in purchasing in the open market.

2nd. That it is literally "penny wise and pound foolish" for a grower to purchase such seeds, as the penny gained in price must be followed by the loss of a pound in the crop.

Although adulteration has much to answer for, it must not be made responsible for all the defect of vegetative power exhibited in the samples of agricultural seeds sold in our markets. Much is due to other causes, which in this essay we are not called upon to describe, but may briefly enumerate. Seeds may be badly ripened, or spoilt by bad weather in harvesting ; they are sometimes cut before they are fully developed, and often harvested in a damp condition, of which heating in the stack is a natural consequence. Again, weeds are allowed to produce and ripen their seeds with those of the crops ; and from carelessness in the field. stack, and barn different varieties of the same kind of seed become mixed together. In short, as much or even more care is required to distinguish good from bad seed, when coming direct from the grower, as from the shop of the seed-doctor. The articles supplied by the latter always have a suspicious unnatural appearance which the practised eye detects at once ; for this reason adulteration seldom escapes notice amongst experienced seed-growers and honest dealers, through whose hands genuine seed is constantly passing. In districts where seeds are not grown to any considerable extent (in Ireland especially), amongst small farmers and small retailers of seeds who make that trade an adjunct to the grocery or provision store, the seed-doctor has done a most thriving trade, underselling the honest dealer, and driving him out of the market.

CLOVER SEEDS.

Old seeds are brushed and rubbed up by machinery, their appearance further improved by some colouring matter to give the purple hue, and then mixed off with fine new seed. These samples may, however, be easily detected by comparison with samples known to be genuine, and by a comparative trial of growth.

In some districts, where the farmers usually sow mixed clover and grasses, *red clover* is adulterated to some extent with the cheaper article trefoil, the farmer thus paying 100 per cent. more for the latter than he ought to be charged. *White clover* undergoes the admixture with old seed which has been put through a rubbing and bleaching process by exposure to the fumes of burning sulphur. When very dear it is dashed with a proportion of *red suckling*, if the latter happens to be the cheaper article of the two.

But the most palpable fraud of the last few years has been the attempt to colour white clover so as to make it resemble *alsike.* Samples thus treated may be detected by the green stain which they leave behind them when wetted and rubbed in the hand.

Old trefoil undergoes the sulphurous bleaching and brushing process to a great extent.

Old trifolium is treated in the same manner.

But in all these cases the purchaser need only compare the suspicious article with a really fine genuine sample of new seed, and he will have no difficulty in coming to a satisfactory decision as to its merits.

The actual *modus operandi* in "doctoring" is, I must confess, unknown to me, and were it otherwise I should not enter into details which could afford no useful information, and might possibly lead to mischief. The power of detecting a fraud is quite independent of the knowledge of the means and manipulations by which it is effected.

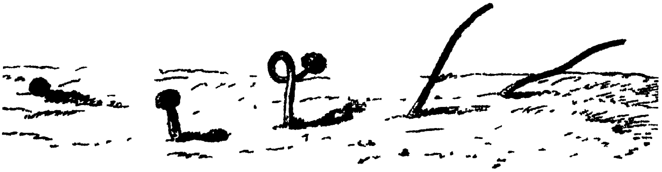
Foreign clover is especially subject to the attack of parasitic weeds, such as *Orobanche elatior* (tall broom-rape), *Orobanche minor* (smaller broom-rape), and *Cuscuta trifolii* (dodder). The broom-rape attaches itself as a parasite to the roots of clover when growing, and as the seeds are very small and numerous it is difficult to exclude them from the sample, and it is thus the mischief becomes perpetuated. But as the upright leafless stem of this plant is tolerably conspicuous, it may be destroyed by pulling so as to separate the bulbous base of the parasite from the root of the clover. Hoeing is in this case useless, since the plant is attached to the very roots of the clover.

Where *dodder* abounds it is fatal to the growth of clover and flax; therefore a knowledge of its characteristics is of the utmost importance to the agriculturist. Dr. Lindley (see Morton's 'Cyclopædia of Agriculture') describes the dodder as a genus of leafless vegetable parasites, maintaining its existence by twining round other plants, into whose stems it inserts its sucker-like roots, destroying them by appropriating to itself the sap which was intended for their own use. In appearance dodder is like a number of fleshy threads twisted round a branch, or it may be compared to long worms, or even to small animal intestines, whence has come one of its vulgar names, *Devil's guts.* Here and there on such threads will be found minute scales, and eventually clusters of small delicate globular white or pink flowers, which appear in balls on the stems, speedily form fruit, and end in producing each four seeds, within which is coiled up an embryo plant, looking like a miniature snake. As the number of flowers in each ball is about fifteen, it follows that every ball will furnish about sixty plants, whence the rapid spread of such pests may be easily understood. As soon as the seed of the dodder is ripe it falls to the ground, and usually seems to lie dormant till the succeeding year; sometimes, however, it germinates immediately. When spring returns the embryo sends one end down into the earth to form a root, and with the other it rises upwards, like a small white thread or worm. It is not then a parasite, but seems to derive its food from the soil, like ordinary plants; it cannot, however, do so long, but withers and perishes unless it touches some living branch or stem, which it immediately seizes by means of a sucker protruded from the point of contact, and twining from left to right, and forming more suckers as it twines, establishes itself upon its victim, and ceases to have any further connection with the soil, being from that time forward a true parasite feeding on the juices of the plant it has seized upon. After making a few turns round the branch, and securing itself firmly in its new position, it again lengthens and catches hold of some other branch, when more suckers are protruded; and thus it goes on branching and twining and sucking and branching again, until it forms that appearance which Professor Henslow so well described as resembling "fine, closely-tangled, wet catgut."

Now, the dodder has a new and independent seat of life wherever it has twined itself round a branch, and as it is incessantly twining and separating and twining again, a single plant is speedily in the condition of a polypus, so that if it be cut into a thousand pieces each piece will continue to grow as if nothing had happened to it. Tearing, the dodder to pieces, then, so far from extirpating it, only multiplies the mischief. As it is only an annual it would be killed if we could prevent its flowering; but that is difficult because of its hiding itself among the lower branches of plants, where it cannot well be seen, and a very few heads of flowers will renew it in a single year. The best plan is to dig up the crop where dodder appears, so as to form a circle

FLAX DODDER.

CUSCUTA EPILINUM.

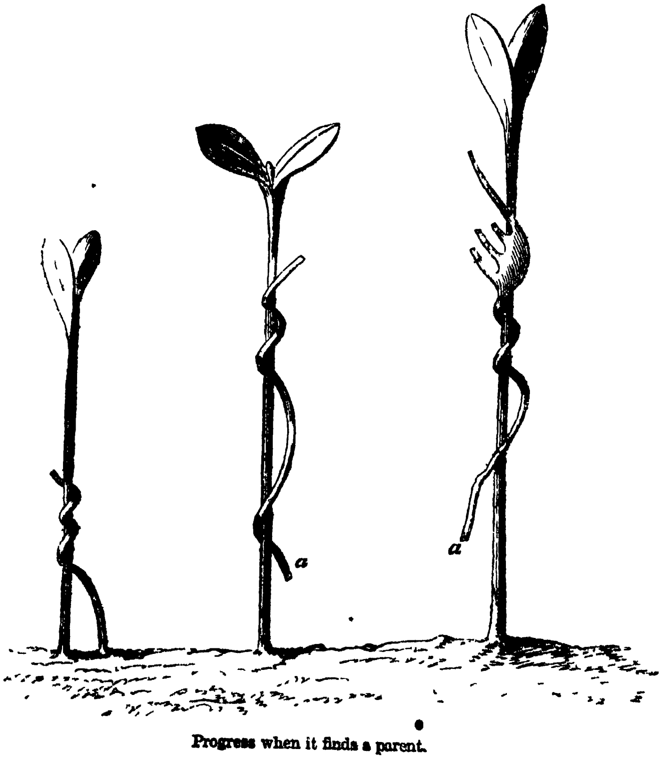


1 Seed.

2 Ditto 3 Ditto germinating.

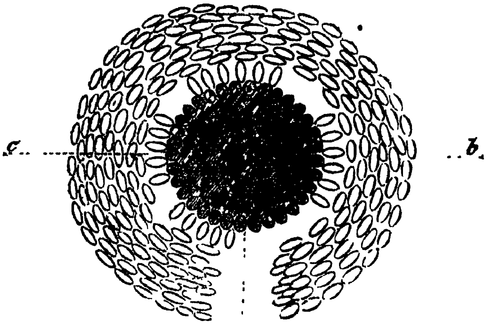
4 On the look out for a foster parent.

5 Dying for want of a parent.



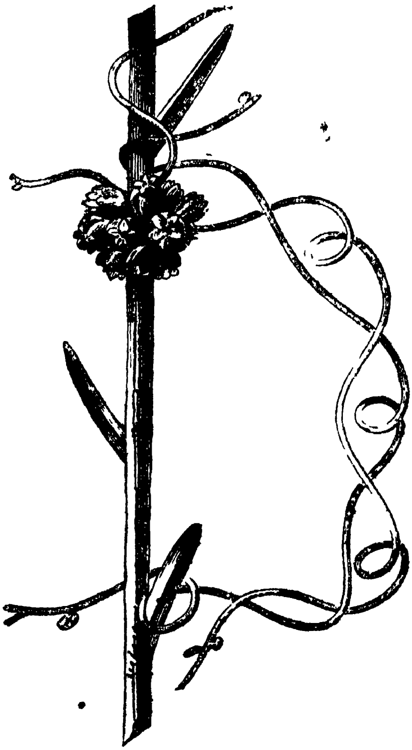
Progress when it finds a parent.

a a Plant elevated from the soil, now a parasite.

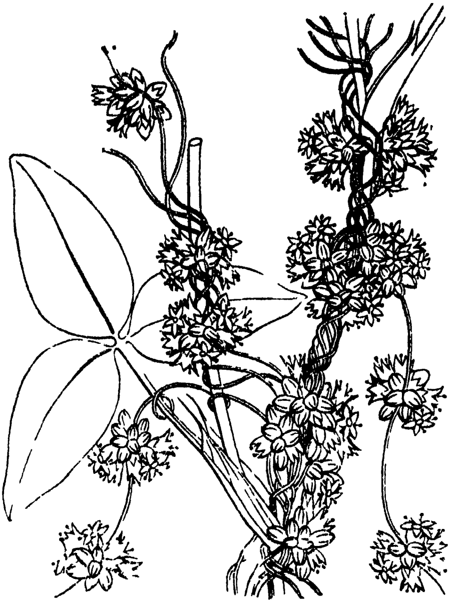


Section of a coil of Dodder round a Flax-stem.

a Flax. *b* Dodder. *c* Radicular cells of Dodder pushing into the Flax.



Tendrils of Dodder on Flax.



Cuscuta Trifolii—Clover Dodder.

considerably beyond the patch apparently formed by it, and then to burn the crop along with the pared soil.

On the Continent the destruction of dodder has been much considered, and many experiments tried. One of these is said to be entirely successful, and being a most simple remedy is deserving of trial. It is merely the application of sulphate of iron (green vitrol) dissolved in water, one pound to the gallon, and distributed from a watering-pot. It speedily destroys the dodder, leaving the clover comparatively uninjured by the application. Two dressings on succeeding days are sufficient, and the plants soon resume a healthy appearance, if not already too much injured by the parasite.*

But it is much more desirable, if possible, to prevent than to cure, and this aim may be considerably aided by greater attention to cleanliness of seed, and especially its freedom from dodder. If lucerne or clover seed is well sifted before being sown the dodder seed will be completely separated. Lucerne seeds are about two lines long and one and a fourth broad; clover seed is much the same, while dodder seed is little more than half the size, and is spheroidal or in shape like the quarter of an orange, looking more like fragments of pale gray clay than an organised body. A "No. 17" sieve will allow it to pass through, and will detain both lucerne and clover seed. The species of dodder are numerous, but the most important to farmers are—

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* 'Our Farm Crops.' By Professor John Wilson. Part viii. p. 125.

1. *Cuscuta epilinum* (*the flax dodder*), with slender pale-green stems, whitish flowers in small distant clusters, and fleshy calyx lobes nearly as long as the corolla. Parasitical on flax.

2. *Cuscuta trifolii* (*the clover dodder*), with reddish-yellow slender branching stems, small white flowers tinged with pink, and a narrow calyx as long as the tube of the corolla. A most formidable enemy to clover-fields.

These were both, perhaps, introduced into this country with foreign seed. Clover dodder excited great alarm in England when it first appeared, some years since, and it still continues its ravages where great attention is not paid to its destruction and prevention. It is supposed first to have come from Affghanistan with lucerne seed or trefoil, and it rapidly spread over this country, for when such a plant once has hold of the land it is, as has been shown, extremely difficult to extirpate or keep in check.

The accompanying illustrations, kindly supplied by my friend Professor Buckman, of Cirencester, will enable the plant to be identified wherever it occurs.

Mr. Buckman, in his Prize Essay on Agricultural Weeds in the 16th volume of the Journal, very properly deprecates a practice which no honest man would follow—of seeding clover too much affected by dodder to be useful for feed. It is true the dodder by weakening the plants renders them more apt to form seed, so that a considerable yield is produced, but it can never be right for an individual to perpetuate a vile weed for the sake of a trifling profit to himself.

RYE-GRASS.

Bright dry and well-kept samples of rye-grass will retain their vegetative power for a number of years. What the buyer has chiefly to guard against is heated and badly-conditioned seed. This defect is evident to the sense of sight and smell, but not so the admixture of spurious seeds, such as one or two varieties of the brome-grass (commonly called lop-grass) and the black grass, "Alopecurus agrestis," or slender fox-tail grass, some of the worst weeds the farmer has to contend with. These ripen with and are harvested in crops of seed rye-grass by careless growers. The seeds being very similar in size to the rye-grass, are very difficult to separate from it; and unless samples are very carefully examined, the existence of the admixture will very probably escape the notice of the purchaser until he takes a view of his growing crop in the following season. From Italian rye-grass the brome-grasses and black grass are still more difficult to separate, as both the genuine and spurious seeds are awned, and unless the buyer is well versed in his business he will be easily deceived. Indeed, I have known small bulks consisting of nine-tenths of brome-grass, a vile weed, publicly exhibited and sold as Italian rye-grass in one of our largest country markets, and that, too, by a respectable dealer of long standing, who was fully impressed with the idea that he was selling true Italian rye-grass.

Very many samples of English and foreign Italian rye-grass are largely admixed with seeds of the comparatively valueless "holcus lanatus," soft meadow-grass, or Yorkshire fog. This is readily distinguished, and (being very light) more easily separated than the black grass, which is a weed of no value as food, but very troublesome to get rid of when once it takes possession of the land. A few years since large quantities of light Scotch rye-grass were sold for exportation, and came back mixed with foreign Italian, but the speculation did not appear to answer well; at least it has not been repeated to any great extent. English dealers, however, still buy foreign Italian by the hundredweight, mix it off with light Scotch rye-grass, often bought at 1*s.* to 1*s.* 6*d.* per bushel, and resell by the quarter or bushel at a handsome profit, whilst if the proportion of light rye-grass does not exceed 25 to 30 per cent., and the admixture is carefully made, the imposture is not readily discovered.

Although with the farmer and country dealer some of the London trade get the credit of these tricks, they sometimes extend to the country, as shown by the following transaction, in which I was personally concerned. Some five or six years since, towards the end of the seed season, I bought of a well-to-do country dealer, who has a high reputation for respectability, and who has (it is said) amassed a large fortune by his dealings, some 50 or 60 quarters of what appeared to be a fine parcel of Italian rye-grass, the want of the usually characteristic awn on a part of the seed being attributed to over-ripening, or some such cause. This sample was immediately resold to Mr. William Skirving, the well-known seedsman of Liverpool, one of the most straightforward and honourable men in the trade, who made a request for immediate despatch. Accordingly, dependence being placed upon the honesty and reputation of the country merchant, the 50 or 60 quarters were forwarded on from London without the usual examination there. When the seed was inspected in Liverpool it was found to contain a large percentage of light Scotch rye-grass, so carelessly mixed that when shot out of the bags the seed showed a streaky appearance, giving plain evidence of the impostor's practices. Accordingly the seed was returned; but, as it was sold for delivery in London, its removal thence without examination prevented me, by the custom of the trade, from enforcing the claim to compensation; although it is very doubtful, I believe, whether the law would not have given me redress, and a sound legal decision on this point would be of great service to the trade.

SAINFOIN.

Sainfoin-seed rarely vegetates well if kept over till the following year, and the best judges cannot always tell old seed from new. If the seed breaks down hard and dry, if it has a dull appearance, a suspicion may be very fairly entertained that it is old,—a suspicion which should only be dispelled by trial of growth, under ordinary circumstances of temperature; for I have known sainfoin-seed to vegetate strongly when planted in a hot-bed, which did not produce a single plant when sown in the field.

For a series of years I have made trials of the growth of parcels of sainfoin-seeds passing through my hands, and I have rarely found the growing seeds exceed 90 per cent. in good samples received direct from the grower; the more common range of growth of genuine parcels is from 75 to 85 per cent.; lots of doubtful character fall much lower than this.

The spurious seeds most commonly found in sainfoin-seed are the common brome-grass and burnet, which are extremely difficult to remove. The burnet is of similar colour, and nearly or quite equal in weight and size with the sainfoin-seed, so as not to be readily distinguished by a casual examination of the sample, although the plants in the field are quickly discerned. With the exception of samples of giant sainfoin grown from the second crop—*i. e.* after a crop of hay—which are usually free from burnet, I believe nearly every other parcel offered upon the market contains burnet to a greater or less extent. It is true once or twice in a season a parcel may be bought very nearly free from admixture; but, as a rule, it is impossible to sell sainfoin without burnet unless the seed is hand-picked,—a process too tedious and expensive to be resorted to. The sainfoin imported from France to a very considerable extent rarely contains less than 2 per cent. of burnet, and as much as 5 per cent. is a common admixture.

If the young sainfoin layers are fed hard with sheep they lose plant and the burnet rapidly increases, and hence the seedsman sometimes gets more blame than he is fairly entitled to; otherwise a small quantity of burnet is not injurious to the crop. If the farmer considers it essential that his sainfoin should be perfectly free from burnet, it is but just the seed-growers should be made responsible; for I believe, if proper care be taken, it is quite possible to weed out the burnet in the growing crop, and thus a perfectly clean sample may be obtained. But if sainfoin and burnet are allowed to ripen together, it is impossible to entirely separate one seed from the other by any machinery the seedsman has at his command. The Bromus sterilis, when found to a large extent, renders the sample almost valueless. Milled sainfoin, or sainfoin-seed, separated from the husk, may be made perfectly free from every spurious seed, with perhaps the exception of burnet. It vegetates more readily upon the removal of the outer husk, but the purchaser has here also to guard against mixtures of old seed and the risk of the vegetative power of the seed having been injured in the milling process by careless or inexperienced hands.

TURNIP, RAPE-SEED, &C.

It is a well-known fact that these seeds, as well as all others belonging to the class from which oil may be extracted, preserve their vitality for a number of years, if well harvested and afterwards stored in a dry warehouse. The chief means of adulteration here employed is the admixture of from 20 to 30 per cent. of dead seed, either dead from age or killed by baking, or some other process into the mystery of which I have never been initiated.

Dead turnip-seed readily finds a market for purposes of adulteration, and small rape-seed being generally at about one-third the price of swede-seed is in demand for mixing with that article, the rape first undergoing a process to destroy its vitality.

Seed is also dressed up with a preparation of vegetable oil to improve its appearance, but this I think commendable rather than otherwise (if not done to make old seed pass for new), as it preserves and improves the vegetative power of the seed by returning to it the oil which it naturally loses in keeping.

MANGOLD-SEED

will also, if well kept, preserve its vegetative powers for a series of years, and old seeds are used for mixing off and thus reducing the price of genuine lots. Mangold-seed is often much injured by mice, which eat out the seed, leaving the outer covering or husk.

As in the case of the turnip, the only means of detecting adulteration by an admixture of dead seed is a trial of growth,—a test which applies to all other descriptions of seeds. Seeds that grow quickly, such as clover, turnip, mustard, &c., may be made to germinate upon damp flannel or blotting-paper, placed in a sufficiently high temperature; but this process will not answer for slow-growing seeds, or those having a thick husk. The best plan is to grow samples in a pot under circumstances of soil, moisture, and temperature resembling as nearly as may be those to which the crop is subjected in the field. Even then a single trial is far from being an infallible test of the germinating power of seeds, and, if the first trial is unsatisfactory, I should always advise that it be repeated. Mr. Charles Appelius, an extensive seedsman at Erfurt, supplies the following information as to the germination of seeds.

"If rye-grass be sown in soil which retains moisture with average tenacity, and buried 1 inch below the surface, 7-8ths of the seed grows in 12 days; if buried 2 inches 7-8ths also grow, but only in 18 days; if 3 inches, 6-8ths in 20 days; if 4 inches, 4-8ths germinate in 21 days; at 5 inches, 3-8ths in 22 days; and at 6 inches the proportion of seeds which germinates is reduced to 1-8th in 23 days.

"On the other hand, when rye-grass is sown and simply harrowed in, it germinates in 5 days.

"Our common agricultural plants may be thus classified, according to the length of time required for the germination of good seeds, at a temperature of 54° to 64°, in a finely-pulverised soil, with a moderate supply of moisture.

From 4 to 7 days	Mustard, turnip, rape, buckwheat, peas, flax, rye-grass, lupine, lentil.
From 7 to 10 days	Wheat, barley, oats, maize, beans, chicory, some kinds of peas, clover, tares, timothy-grass.
From 10 to 11 days ..	Carrots, parsnips, burnet, sainfoin, parsley, oat-grass, meadow-grass, brome-grass, mangold.

If circumstances are at all unfavourable, the time required for the vegetation of the seeds named in the last section is increased from 14 to 20 days."

CARELESS OR ACCIDENTAL ADULTERATION BY THE GROWER.

Although this can hardly be called adulteration, yet as the results are equally injurious to the buyer, and as it may be an equally dishonest and dishonourable action, I shall briefly refer to it; and I shall quote some of the remarks made by Mr. Buckman in his interesting Prize Essay on Agricultural Seeds, Royal Agricultural Society's Journal, vol. xvi. p. 359, and his articles on Agricultural Seeds, as printed in the 'Gardener's Chronicle' of 1859, referring the reader to these papers for more minute particulars.

Of casual adulteration, or rather admixture, the saving seed from dodder-infected clover, referred to a few pages back, is an example, as is also that of taking seed from exceedingly foul rye-grass. Of this last practice Mr. Buckman very properly observes (vol. xvii. p. 536 of this Journal), "A dishonest farmer has a crop of seeds which may be very foul, especially with a prevalence of lop (brome) grass. In this case he knows it will not only be a short but a poor crop of hay and grass. He therefore seeds it, and the lop and the rye grass thus become inseparable, and the superior weight of the former makes up a tolerable weight of seed, which, even if sold at a reduced price because it it is not of the best quality, pays better than any other mode of dealing with the crop; and thus as long as men are rogues enough to seed foul patches and others are so foolish as to buy the cheapened produce, so long will this be a source of weeds. Yet, so far as clean farming is concerned, we cannot consider this title to be deserved, unless as well as destroying weeds it also provides against sowing them."

A very just remark; but it must be observed, that a farmer who studies to keep his land clean is generally equally desirous to obtain pure and good seeds. It is the careless farmer who throws foul inferior seeds into foul land, and then wonders at the quantity of weeds; his neglect in not keeping the land clean hindering him from noticing that the rubbish he sows adds to the foulness of his land.

Another fraud—for it deserves no better name—is sometimes practised by the growers of turnip, mangold, and carrot seed. Generally these are, and ought always to be, grown from roots of one variety, selected for their shape, carefully transplanted and cultivated; so that the seed is free from any foreign admixture, whilst the stock or variety is gradually improving. But this is, when properly conducted, an expensive process, and the conscientious grower cannot compete in price with the man who sows a coarse, hardy kind broadcast on his stubbles, leaves them to flower in the next summer, and then harvests; in a slovenly manner, a mixture of charlock, rape, and turnip seed. Moreover, as varieties are improved, the quantity of seed which they yield decreases, such improvement consisting in an enlargement of the bulb and a diminution of the leaf and stalk: a farther reason why the grower of improved varieties can never compete in price, but may be a loser even when charging double the price at which the careless grower makes his large profit.

FOREIGN SEED

is probably more adulterated by admixture than our own, because the growers are more careless in allowing weeds in their land, possess inferior machines for cleaning, and sometimes have the credit of purposely mixing all kinds of rubbish with the seed. The dodder in our flax and clover is an instance of foreign introduction.

Mr. Buckman, in his Essay on Agricultural Weeds ('Journal,' vol. xvi. p. 376), speaks of a field sown with foreign flax-seed which came up full of black mustard, which, besides the immediate injury to the crop, so infested the soil that after an interval of six years it still existed as a troublesome weed in that and the neighbouring fields. But as mustard is easily recognised from flax and may readily be separated from it in the cleaning, this evil was in part due to the carelessness of the farmer.

The disgraceful state in which much foreign seed is sent out is shown by Mr. Buckman in the 'Agricultural Gazette' of August 28th, 1858.

Eight samples of foreign seed, sent for examination (of which 5 were clover, by no means over-clean; 2 of Italian rye-grass, not only very light but containing a large quantity of mischievous weeds; and 1 turnip, the genuineness of which it is difficult to ascertain, as seeds of charlock, rape, &c., are difficult to detect), gave the following results:—

Copy of Label.	Weight in grains of 2 oz by measure	Estimated weeds in an Imperial pint.	Remarks.
1 Red clover (foreign)	672	8,800	Plantain, &c., a good seed.
2 Red clover (foreign)	696	3,860	All plantain, a good seed.
3 White Dutch clover (foreign)	688	16,000	Polygonaceæ, plantain, &c.
4 White Dutch clover (Silesian)	704	28,800	Polygonaceæ, plantain, &c., weight made up by grains of silex.
5 White Dutch (French)	696	24,000	Polygonaceæ, plantain, &c., weight made up by grains of silex.
6 Imported Italian rye-grass	212	1,440	Ranunculus, plantain, lop.
7 Imported Italian rye-grass	216	960	Ranunculus, plantain, lop.
8 Skirving's improved purple-top swede	576	..	Only a small proportion floated on water.

The ill effect of sowing foul seed is also shown by Mr. Buckman in an article in the 'Agricultural Gazette' of October 15th, 1859. He here compares the weeds growing in neighbouring fields on the College farm, all sown with clover and rye-grass, and all farmed in the same manner. Of 64 species of weeds he only found 34 common to the three fields, and but few plants the seeds of which are not to be found in clover and rye-grass. He deduces from this that the seed was grown in different localities, being bought of different seedsmen, and that the farmer sows most of his weed-pests with his seed. "In the case of the clover-crop," he remarks, "each weed-seed sown subtracts from the sum of the clover-seed. Nor is this all the evil, as very many of the weeds grow so fast as to smother and kill (or, at least, so much weakens that winter kills) much of the clover in their vicinity; and lastly, many weeds seed the first year, and are succeeded in the next by an immense increase. These are circumstances which will in a great measure account for much of the so-called clover-sickness of the soil."

With a few remarks on the modes of avoiding and detecting the adulteration of seeds, I shall conclude.

I have mentioned the seed-dealer as a medium between the buyer and seller or grower. He is rather more than this: he is a guarantee to the buyer that the seeds he supplies are good, free from seeds of weeds, and answering to the description. He secures the buyer, when the latter is not very conversant in the article, from the frauds in quality and price to which he might be subject in purchasing promiscuously, and gives his advice as to seeds suitable to various soils and seasons. Therefore it is obvious that the buyer's chief and best precautions are,—1st. To select a responsible and respectable seedsman, and not to seek goods at the lowest price and of the lowest value; if he does this, a seedsman can no doubt supply a cheap article, but can he recommend it? 2nd. To purchase seed with a warranty that a certain percentage of the seed will vegetate; the warranty to cover the value of the seed, or more if necessary. 3rd. To try a certain number of seeds, both in a hot-bed and in the open ground, and see what proportion vegetates: the first plan speedily shewing the actual number of living seeds, the second what number would probably grow under open-air culture. 4th. To examine seeds himself with a microscope, that he may detect the percentage of weed-adulterations; the microscope, carefully used, would probably detect not only this but the new or old, doctored or mixed nature of seeds—a single glass is sometimes used now, but a microscope of tolerably high power would be far more efficacious. 5th. To note that the adulteration of rye-grass by admixture, however carefully done, may be detected easily when one seed is lighter than the other; the winnowing-machine will separate each according to their respective gravities. 6th. To get good genuine samples of similar seed, with a view to a comparison with that purchased both by the eye and by floating the two in water as a test of comparative gravity. 7th. Since, however simple these modes are, many persons will be too much engaged to try them, and will buy seed just before sowing and put it in the ground with merely a cursory examination, why should we not adopt the practice of taking a sample for examination by a scientific botanical examiner, that he may determine the percentage of weeds and of live seeds, just as we have chemical analysts to examine artificial manures? A few shillings thus laid out might save pounds.

To conclude, the adulteration of seeds is a practice of trade, or rather a system of fraud similar to that of falsely labelling goods for sale: as when 100 yards of cotton thread are labelled as 200; or a tin of coffee stated to weigh 2 oz. or 3 oz. more than its true weight. But there is this difference in these latter instances, that the buyer of the cotton or the coffee suffers an immediate and direct loss, the amount of which can be at once estimated; but the loss to the buyer of doctored seeds is far greater, affecting all the expected increase of the fruits of the earth, if not permanently tainting the soil on which they grow. In honourable trade things should be called by their proper names, and if it is necessary to have mixed and doctored seeds they should be sold as such.

Adulteration plainly owes its origin to the desire to amass wealth, and, so long as the demand for cheap goods continues, I fear it will be pandered to by the unscrupulous trader. Dr. Buckman's words in the 'Journal,' vol. xvii. p. 376, may prove a fitting conclusion: "Pure or clean seed is ever worth paying a greater price for, as the reverse may entail trouble and expense for years. Any mechanical processes, therefore, which can be made available for cleaning seed are well worthy of patronage. A seedsman who will be careful in the preparation and collection of seed deserves the best support. In order also to assist in this matter, farmers should be particular not to allow a dirty patch to stand for seed, although it may be 'the most profitable thing they can do with it.'"

III.—*On the Composition of Cheese, and on Practical Mistakes in Cheese-making.* By Dr. AUGUSTUS VOELCKER.

IN the opinion of many persons English cheese is not what it used to be in the good old time, when it was far more common than now-a-days for farmers' wives personally to preside over the dairy and conduct the making of cheese through its various stages. Some people assert positively that the English cheese of the present day is inferior in quality to that which was made centuries ago. It is of course impossible to give satisfactory proofs of this supposed inferiority; but at the same time it must be admitted that the prevailing custom of leaving the chief dairy operations almost entirely in the hands of servants furnishes strong presumptive evidence in favour of those who maintain these views. As a rule, we have found the best cheese on farms where the mistress of the house was herself dairymaid-in-chief, especially if industrious habits and scrupulous cleanliness were associated with superior intelligence. Indeed I have had recently frequent occasion to notice the intimate connection which appears to exist on the one hand between good cheese and cleanliness, order, general intelligence, and desire to excel, and on the other hand between bad cheese, slovenliness, ignorance, and practical conceit. In the best-managed dairies, however, cheese-making is practised entirely as an empiric art, which is admitted by our best practical authorities to be capable of great improvement, the importance of which is obvious when we consider the large amount of capital directly or indirectly embarked in dairy-farming. Mr. Humberstone, member for Chester, has the merit of having first directed the attention of our Society to the importance of scientific investigation into the principles of cheese-making; and the Council, on the recommendation of the Chemical Committee, made a special grant to enable me to visit the principal dairy districts of England, to carry out certain practical experiments, and obtain what practical assistance I required. The more direct laboratory experiments, which, like the whole investigation, are still in active progress, have been selected by the Chemical Committee as one of the regular subjects for investigation for the current year. During the last ten months I and two of my assistants have been almost exclusively occupied with the analytical work demanded by a thorough investigation into the principles of cheese-making. At the same time I have spent between four and five weeks at different times in visiting the dairies of Gloucestershire, Wilts, Somersetshire, Warwick, Stafford, and part of Cheshire; and I purpose paying another visit to Cheshire and Derbyshire in the ensuing summer vacation. This Paper will embody some of the practical conclusions to which I have arrived, partly from my visits, and partly from my investigations.

The first point to be observed is, that cheese is often spoiled (to use an Irishism) before it is made—that is, before it is separated from the milk: in other words, the milk is spoiled. Then the cheese is spoiled during the making, and also in the keeping. Again I have learned that richer cheese may be made on some land, even when a portion of cream has been taken from the milk, than on other land where the whole milk is used. 3rd. I concur with our best and most intelligent cheese-makers in the opinion, that good saleable, though perhaps not very fine-flavoured, cheese can be made on any description of land, provided proper care and attention are paid to the management of the milk at the beginning, to the treatment of the cheese in the tub, and to its after ripening. 4th. From all I could learn practically, and from what I have seen with my own eyes, I have come to the conclusion that bones improve the quality of the pasture and the richness of the milk, but also that more care is required to make cheese from boned-pasture than on poor land. 5th. The flavour of the different kinds of cheese, such as Cheddar, Stilton, Cheshire, and others, is much more dependent on the method in ordinary use in these different counties than on the quality of the pasture, although the latter exercises a considerable influence. The inferiority of the Boothy cheese, made from dry food, to that produced when the cows are at grass, is well known. Nevertheless, admitting that food does much affect the flavour of cheese, I still am of opinion that the various practical manipulations exercise a yet higher influence in this respect. 6th. Each system of cheese-making, whether that of Gloucestershire or Somersetshire, appears to have its peculiar excellences, but also its peculiar defects. 7th. Matters altogether indifferent are frequently insisted upon as essential to success, whilst others of the greatest importance are either neglected altogether or much under-valued: unless therefore a person thoroughly understands the grounds of his selection and preference, it is better to adopt one empiric method than to attempt to combine the different plans. 8th. I found good makers of cheese who had never heard a word about chemistry. 9th. Although much mystery is thrown around this art, all that is mysterious about it is purely accidental: the process in itself is very simple, and accords well with scientific principles so far as these have been ascertained; but skilful management is perhaps rather the exception than the rule. 10th. Even good practice may be considerably improved, or, more correctly speaking, simplified, by the application of scientific principles to cheese-making. 11th. With respect to the recent mechanical improvements which have been introduced in the dairy districts, Keevil's and Coquet's apparatus, and others which have been described at some length in a former volume of our Journal, save indeed a great deal of labour and time, but otherwise effect nothing which may not be done by skilful hands. 12th. Milk, as I have ascertained by numerous analyses, varies much in its composition, for which reason great differences must also be expected in cheese. 13th. Considerable loss both in quality and quantity of cheese was found to arise from careless management. 14th. In studying the action of rennet on milk I find that misapprehension, if not altogether wrong statements, prevail in what has hitherto been said and written respecting its action. I shall have presently to advance proofs in confirmation of this assertion. 15th. I would observe, that generally the scientific principles involved in the manufacture of cheese are either misstated by scientific writers on the subject, or but imperfectly recognised by practical men.

These are some of the principal conclusions at which I have arrived in the course of my investigation. As it is not my intention to write a complete essay on cheese-making, I shall at present only endeavour to point out—1st, some of the chief errors made in the process, stating my reasons for speaking of them as such; and 2ndly, to suggest some remedies and safeguards. But, in order to make my subsequent remarks a little more intelligible, I must briefly allude to the composition of milk, which, as is well known, is not a uniform white liquid, but a fluid owing its opaque character to a number of little cream-globules. Seen under a miscroscope of no very great power, milk appears as a colourless fluid in which there are floating innumerable little white globules or small bags containing fatty matter. The butter is encased in these microscopic bags or cells, which themselves are composed of very much the same material as the curd of milk. These, being lighter than water, rise on standing, and are removed as cream. If it were possible to separate the cream completely by standing, the milk would be almost colourless; but inasmuch as a certain number of milk-globules always remain suspended in milk, even after long standing, skimmed-milk is always more or less opaque. We must find, therefore, in the cheese made from skimmed-milk a certain amount of butter, though much less than in whole-milk cheeses. On the removal of the cream the milk becomes bluer and more transparent; and hence the transparent and peculiarly blue appearance of some of the London milk is indicative of its poorness. On allowing milk to become acid, which it does readily in warm weather, one of its constituents, which, from its sweet taste, is called sugar-of-milk, is converted, at least in part, into lactic acid. This change is effected by simple transposition of the elementary particles of milk-sugar, without anything being added or detracted from them. This lactic acid again separates the next constituent, the casein or curd of milk, which may also be separated by rennet. On the removal of the casein, either artificially by rennet or naturally by the lactic acid, we obtain whey; and, provided this whey is perfectly clear and free from all butter and curd (which is not generally the case) in our dairies, we may, by evaporating the clear liquid, obtain milk-sugar and a certain quantity of matter which is incombustible, and constitutes the ash of milk. These then are the principal constituents of milk—curd or casein, butter, milk-sugar, and mineral matters or ash. Now, in the preparation of cheese we separate the curd or casein, and, if we want to make good cheese, also the butter and a small quantity of mineral matter contained in the milk. In the whey remains the milk-sugar and most of the mineral matter. A glance at the subjoined diagram, which gives the composition of different kinds of milk lately analysed by me, will show the enormous difference that exists in the relative amounts of the various constituents of milk.

Composition of New Milk.

	No 1. Milk analysed Oct. 21, 1860.	No 2. Milk analysed Nov 29, 1860.	No 3. Milk analysed Sept. 18, 1860.	No. 4. Milk analysed Aug 7, 1860.	No. 5. Milk analysed Sept 6, 1860 (Morning's milk)	No. 6. Milk analysed Sept. 6, 1860. (Evening's milk.)
Water	83·90	85·20	86·65	87·40	89·95	90·70
Butter	7·62	4·96	3·99	3·43	1·99	1·79
Casein	3·31	3·66	3·47	3·12	2·94	2·81
Milk-sugar	4·46	5·05	5·11	5·12	4·48	4·04
Mineral matter (ash)	·71	1·13	·78	·93	·64	·66
	100·00	100·00	100·00	100·00	100·00	100·00
Percentage of dry matters	16·10	14·80	13·35	12·60	10·05	9·30

I have selected these analyses from a considerable number of milk-analyses lately made in my laboratory. They illustrate strikingly the great differences that exist in the quality of new-milk. It might readily be imagined that milk such as that which I examined on the 6th of September, containing 90½ per cent. of water, had either been diluted with water, or at least produced by cows fed on mangold-tops, distillery-wash, or similar food. Such, however, was not the case. The cows which yielded this poor milk were out in pasture, and every precaution was taken to get a fair average of the milkings from some 8 or 10 cows. The milk was received by me almost directly after it had left the udder, and I can thus vouch for its being genuine, and its watery condition natural. The pasture, however, was poor and overstocked, so that the daily growth of grass furnished hardly enough food to meet the daily waste to which the animal frame is subject, and was thus not calculated to meet an extra demand of materials for the formation of butter and curd. The milk consequently became not merely deficient in quantity, but also poor in quality. It is well then to bear in mind that an insufficient quantity of food in the case before us caused the supply of milk to be small and unusually poor. This analysis illustrates and confirms a principle generally recognised by good dairy-farmers, that it is bad policy to keep more cows than can be liberally supplied with food. The evening's milk on the 6th of September, it will be noticed, contained about ¾ per cent. more water and somewhat less casein and butter than the morning's milk of the same cows on the same day. From this and other instances some may be disposed to infer that the morning's milk is generally richer than the evening milk—a view which I myself was disposed to adopt until a larger range of experiments proved to me its inaccuracy. In truth, the comparatively greater richness of the morning or the evening milk depends on a variety of circumstances so complicated as to require a lengthened discussion, which I must postpone to a future paper.

The remarkably small quantity of butter in the milk of the 6th of September appears very striking when contrasted with the proportion of butter found in good milk, and still more so when compared with the unusually large quantity contained in the rich milk analysed on the 21st of October. This milk, like that of the 6th of September, was produced by cows out in grass, without any additional food rich in fat, such as linseed or rape-cake, and yet it contained nearly four times as much butter as that of the cows kept on an insufficient quantity of poor grass. The beneficial influence of abundance of good pasture on the butter-yielding qualities of milk, and the contrary effect of a stinted supply of grass, are seen in bold relief in the first and the sixth analyses.

Whilst the proportion of butter in different samples of milk varies exceedingly the relative amounts of curd or casein, of milk-sugar and of ash, though liable to certain fluctuations, do not greatly differ in good, indifferent, or even very poor milk. It would thus appear that the quantity and quality of food, and other varying circumstances which affect the composition of milk, exert their influence principally on the proportion of butter. And as this is certainly the most valuable constituent of cheese, and 1 lb. of butter suffices for about 2 lbs. of saleable cheese, we can readily understand that in one dairy a considerable quantity of cream may be taken off the milk, and yet a better quality and a greater quantity of cheese can be made than in another dairy, from the same quantity of milk, from which no cream has been removed.

The second analysis exhibits nearly 5 per cent. of butter, a proportion which is decidedly above the average. This analysis has been selected as an example illustrating the increasing richness of milk in the fall of the year. Practical cheese-makers are well acquainted with the fact, that in autumn, when green food becomes scarcer, the quantity of milk diminishes considerably, but that the weight of cheese which can then be made from a given quantity of milk is much greater than in spring or summer. An inspection of the second and fourth analyses affords a ready explanation of this fact.

Both these milks came from the same dairy. In August the milk scarcely contained 3½ per cent. of butter, and, in round numbers, 3 per cent. of casein; in November it yielded 5 per cent. of butter and ½ per cent. more casein than in August. Rightly to appreciate this increase, it should be regarded, not so much as an addition of 2½ parts in 100 parts of fluid, as of 2½ parts to 12½ solid matter, the total percentage found in August, or an increase of 20 per cent. on the solid matter. And if we consider that most of the milk-sugar and of the mineral matters pass into the whey in the cheese-manufacturing process, the difference in the cheese-producing qualities of the August and November milk appears still greater.

In one of the milks we have 3½ per cent. of butter and 3 of casein, or 5½ per cent. of solid cheese-producing materials in every 100 parts of milk; in the other there are 5 per cent. of butter and 3½ of casein, or 8½ of solid cheese-producing matters. Thus the real proportion in the two milks is as 5½ to 8½—that is to say, the latter yields 55 per cent. more dry cheese-forming materials than the former; and as we find in good cheese about one-third of its weight of water, the 55 per cent. of dry matter with this complement of water will amount to 83 per cent. In other words, 1 gallon of the November milk will nearly produce double the quantity of saleable cheese which can be made from the August milk.

The third analysis represents the composition of good, rich milk, and the fourth the average composition of milk neither rich nor poor.

In rich milk the proportion which the butter bears to the casein is always much greater than in milk of average quality. In the latter there is about as much butter as casein, and in decidedly poor milk the proportion of casein is larger than that of butter.

The preceding analyses have brought to light unexpectedly large differences in the amount of butter which is contained in different samples of milk. With proper care and skill in cheese-making nearly the whole of the butter becomes incorporated with the curd; and as the market price of cheese depends in a great measure, though not entirely, upon the proportion of butter which it contains, it is evident that the original quality of the milk must have a decided and direct influence on the quality as well as on the quantity of cheese which can be made from it. Although precisely the same process may be adopted, and equal care and attention may be bestowed on the manufacture, it nevertheless happens that not only more but also a better quality is made in one dairy than in another from the same number of gallons of milk.

The food upon which dairy-stock is kept unquestionably exercises a great influence on the milk. It is, therefore, reasonable to expect certain pastures to be naturally better adapted for the production of rich cheese than others. Thus good old pasture not only produces richer milk than grass from irrigated meadows, but likewise a better quality of cheese, all other circumstances being equal in both cases. There is thus some reason in the almost universally received opinion that on some land good cheese can invariably be made, whilst on other land no amount of skill or care can bring about a like result. But at the same time I believe it is quite a mistake to think that good cheese can only be made in certain localities, and that the character of the pasture accounts entirely for the great differences found in the quality of this article. Good saleable, and even high-priced, cheese, I believe with Mr. Harding, can be made in any locality, whatever the character of the pasture may be, where an industrious and skilful hand, and an observant and intelligent head, presides over the operation; and, on the other hand, the best and richest milk, the produce of peculiarly favourable pastures, may be spoiled by a slovenly and ignorant dairymaid. But inasmuch as the nature of the herbage, as is well known, affects the richness, and especially the flavour, of the milk, and the herbage is sweeter in one locality than in another, and at one time of the year than at another, it is not likely that the very finest-flavoured cheese should be made indiscriminately on all land and all the year round. Still, after every allowance has been made for these natural peculiarities, it is nevertheless true that the various processes which are adopted in different counties determine in a great measure the prevailing character of the produce, whilst the want or bestowal of care and attention in making cheese, whether it be on the Cheshire, Cheddar, or any other plan, materially influences the quality of the produce.

Before I proceed to point out some of the practical errors which are often made in the manufacture of cheese, let us examine the composition and chief peculiarities of some of the principal kinds made in England.

English cheese is produced either from milk to which an extra quantity of cream has been added, or secondly from the whole-milk, or thirdly from milk from which more or less cream has been taken before the addition of the rennet. Accordingly we obtain—

1. Cream-cheeses.
2. Whole-milk cheeses.
3. Skim-milk cheeses.

The first class is made in limited quantities only, and constitutes a luxury which is found chiefly in the houses of the wealthy.

The second class is produced in larger quantities; and the third furnishes our chief supply of this important article of food for the working-classes of this country.

To the first class belong Stilton, Cream-Cheddar, and the choicest quality of Cotherstone cheese, or Yorkshire Stilton. These, according to their quality, fetch more or less a fancy price in the market, as they are made in perfection only by few persons, and in limited quantity.

To the second class belong the best Cheshire, some Cheddar, good Double Gloucester, most of the cheese made in the Vale of Berkeley, as well as whole-milk cheese produced in Wiltshire and other counties of England.

In the third class we meet with ordinary Cheshire, Gloucester, Wiltshire, Warwickshire, Shropshire, Leicestershire, and other cheeses made in districts where its manufacture is combined with that of butter.

This division into three classes is to a great extent an arbitrary one, adopted more for the sake of convenience than on account of any definite line of demarcation. In reality the richer admixture often only compensates for the inferiority of the natural product. Thus the best Cheshire and Cheddar cheese is frequently as good and rich in butter as Stilton. Again, it is well known that in some dairies a richer cheese can be made from the mixed new morning's-milk and skimmed evening's-milk than in others from the whole-milk. The classification, therefore, does not so much refer to the quality and value of the cheese as to the description of milk which is used.

STILTON AND COTHERSTONE CHEESE.

The following Table embodies the results obtained in the analyses of two samples of Stilton and Cotherstone cheese:—

	Stilton.		Cotherstone, or Yorkshire Stilton.	
	No 1.	No. 2.	No 1.	No. 2.
Water	32·18	20·27	38·28	38·23
Butter (pure fatty matters)	37·36	43·98	30·89	29·12
*Casein	24·31	33·55	23·93	24·38
Milk-sugar and extractive matters ..	2·22		3·70	2·76
†Mineral matters (ash)	3·93	2·20	3·20	5·51
	100·00	100·00	100·00	100·00
* Containing nitrogen	3·89	..	3·83	3·90
† Containing common salt	·89	·29	·79	2·55

The two Stilton cheeses are very rich in butter, especially the second, which contains 44 per cent. of pure fatty matters; and as we have in common butter from 15 to 18 per cent. of water, besides casein and other impurities, the pure fat in the second Stilton represents more than 50 per cent. of butter. The first analysis expresses the composition of a rather new Stilton. It was sold at 1*s.* per lb. last October. The second analysis is that of an old Stilton, selling at 14*d.* per lb. There is about 12 per cent. less water in it than in new Stilton; more butter and less salt. Notwithstanding the smaller amount of salt, it had a more saline taste and much better flavour than the newer cheese. This saline taste is generally ascribed to the salt, and complaints are sometimes made by persons fond of mild-tasting cheese, that old cheese, in other respects rich and good, has been injured by too much salt. This is a mistake, of which the proof is found in the analyses of these two Stilton cheeses. The first was quite mild in flavour in comparison with the other, and yet it contained three times as much salt as the more saline-tasting older cheese. The fact is, the saline taste is developed during the ripening of cheese; newly-made cheese, though strongly salted, is always mild in taste. During the ripening of the cheese a portion of the casein or curd suffers decomposition, and is partially changed into ammonia; the latter, however, does not escape, but combines with several fatty acids formed in the course of time from the butter. Peculiar ammoniacal salts are thus produced, and these, like most other salts of ammonia, have a pungent saline taste. The longer cheese is kept, within reasonable limits, the riper it gets; and as it ripens the proportion of ammoniacal salts, with their pungent saline taste, increases. It can be readily shown that old cheese contains a good deal of ammonia in the shape of ammoniacal salts. All that is necessary is to pound a piece with some quick-lime, when, on the addition of a little water, a strong smell of spirits of hartshorn will be developed. In well-kept, sound old cheese the ammonia is not free, but exists in the form of salts, in which the base is ammonia in combination with butyric, caprinic, caprylic, and other acids, generated under favourable circumstances by the fats of which butter consists. Ripe cheese, even if very old, but sound, instead of containing free ammonia, always exhibits a decidedly acid reaction when tested with blue litmus-paper. Rotten cheese, on the other hand, is generally alkaline in its reaction, and contains free ammonia.

I have made a quantitative determination of the amount of ammonia in old Stilton cheese, and found it to amount to 1·81 per cent.

The first Cotherstone or Yorkshire Stilton was made near

Barnard Castle, in the Vale of the Tees, and sold at 1*s.* per lb. It is highly esteemed in Durham and Yorkshire; but, to my taste, the cheese which I analysed is not to be compared with good, genuine Stilton, nor is it equal in flavour to Cheshire or Cheddar.

Cotherstone cheese, it will be noticed, contains a very much larger proportion of water than even new Stilton. This imparts to it a smooth and apparently rich texture, but the proportion of butter is not really as great as it appears to be, nor, in point of fact, equal to that found in an average Cheddar. It has usually a very strong taste, which would be decidedly objected to by Cheshire or Gloucestershire factors. In its preparation a good deal of whey appears to be left in the curd in mechanical combination, and to be the principal cause of the strong taste and smell which are its characteristics, and in which, more than any other English cheese, it resembles the foreign Rochefort.

CHESHIRE AND CHEDDAR CHEESE.

In making best Cheshire and good Cheddar cheese the whole-milk is used, and cheese generally made but once a day.

The following Table shows the composition of two kinds of Cheshire and a number of Cheddar cheeses:—

	CHESHIRE CHEESE.		CHEDDAR CHEESE.					
	No 1. Old.	No. 2. New	No. 1. Old.	No 2. 5 Months old.	No 3. 6 Months old.	No. 4.	No 5.	No. 6.
Water	32·59	36·96	30·32	36·17	31·17	33·92	37·85	38·43
Butter	32·51	29·34	35·53	31·83	33·68	33·15	28·91	23·28
*Casein	26·06	24·08	28·18	24·93	26·31	28·12	25·00	32·37
Milk-sugar, lactic acid, and extractive matters ..	4·53	5·17	1·66	3·21	4·91	·96	4·91	2·10
†Mineral matters (ash)	4·31	4·45	4·31	3·86	3·93	3·85	3·33	3·82
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	4·17	3·84	4·51	3·99	4·21	4·50	4·00	5·18
† Containing common salt	1·59	1·91	1·55	1·18	1·15	1·23	·52	·65

The first analysis illustrates the composition of good ripe, and the second that of good new, Cheshire cheese.

Since a good deal of water evaporates in keeping, the proportion of dry casein, of mineral matters, and especially of butter (pure fat), must become larger with age.

The rich appearance of old cheese, however, is by no means attributable entirely to a very large proportion of butter; nor is the poor condition of new or badly-made cheese referable solely to a deficiency of butter. One of the chief tests of the skill of the dairymaid is the production of a rich tasting and looking, fine-flavoured, mellow cheese from milk not particularly rich in cream. That this can be done is abundantly proved by the practice of good makers. One of the finest Cheddars which I have ever examined is that mentioned as No. 4 in the above table. This was made by Mr. Harding, Marksbury, Somersetshire, and analysed by me when about six months old. Like all good cheeses, it of course contains a large amount of butter; though, as I found by experiment, not nearly so large an amount as its appearance, rich taste, and fine mature condition seemed to imply. Though only six months old, it had a much more mature appearance than the Cheddar cheese No. 1, which was at least eleven months old when analysed; and, thanks to Mr. Harding's skill and experience, had a much fatter and more mellow appearance and richer taste than a specimen which actually contained 2½ per cent. more butter.

Thus we see that the proportion of butter does not entirely determine the value of cheese, since a high-priced Cheddar or Cheshire cheese does not necessarily contain more butter than another which fetches 8*s.* to 10*s.* less per cwt. in the market.

In the opinion of good judges the Cheddar cheese No. 1, notwithstanding the larger amount of butter, and the smaller amount of water, which it contained, was worth less than No. 4 by 1*d.* per lb.—no inconsiderable difference in the returns of a dairy to remunerate careful and skilful management. The peculiar mellow appearance of good cheese, though due to some extent to the butter which it contains, depends in a higher degree upon a gradual transformation which the casein or the curd undergoes in ripening. The curd is hard and insoluble in water, but by degrees it becomes softer and more soluble, or, speaking more correctly, gives rise to products of decomposition which are soluble in water.

Now if this ripening process is badly conducted, or the original character of the curd is such that it adapts itself but slowly to this transformation, the cheese when sold will be, comparatively speaking, tough, and appear less rich in butter than it really is; whilst in a well-made and properly-kept cheese, this series of changes will be rapidly and thoroughly effected. Proper ripening thus imparts to cheese a rich appearance, and unites with the butter in giving it that most desirable property of melting in the mouth. On examining some cheeses deficient in this melting property, and accordingly pronounced by practical judges defective in butter, I nevertheless found in them a very high percentage of that substance—clear proof that the mellow and rich taste of cheese is not entirely, nor indeed chiefly, due to the fatty matters which it contains.

Good Cheshire and Cheddar, on an average, contain about the same quantity of butter; but of course inferior cheeses defective in this respect are to be found in both localities. The analysis No. 6 shows the composition of such an inferior Cheddar.

DOUBLE AND SINGLE GLOUCESTER CHEESE.

'Gloucester, especially double Gloucester, is generally sold as a whole-milk cheese. It is, however, seldom made of the whole-milk. In most dairies more or less of the cream of the milk is made into butter; but unless the whole evening's milk is skimmed and added to the whole new morning's milk—in which case the cheese made is "half-coward"—the produce, whether single or double, is said to be whole-milk cheese. The distinction of single and double Gloucester is one merely of size and thickness, and has nothing to do with the quality.

The following Table embodies the results of some analyses of double and single Gloucester cheese:—

Double Gloucester.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
Water	32·44	32·80	38·83	38·14	40·88	33·41
Butter	30·17	27·22	26·77	24·16	22·81	32·69
*Casein	31·75	34·76	26·25	26·56	31·88	27·75
Milk - sugar, lactic acid, and extractive matters	1·22		3·18	6·40		2·23
†Mineral matters (ash)	4·42	5·22	4·97	4·74	4·43	3·92
	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	5·12	..	4·20	4·25	..	4·44
† Containing common salt	1·41	1·27	2·04	1·28	1·45	1·01

Single Gloucester.

	No 1.	No. 2.	No 3.	No. 4.	No 5.	No 6.	No 7.
Water	28·10	31·96	37·20	31·81	32·42	37·91	36·50
Butter	33·68	31·37	27·30	29·26	27·42	22·70	28·75
*Casein	30·31	29·37	24·50	26·12	34·46	31·25	25·75
Milk - sugar, lactic acid, and extractive matters ..	3·72	2·85	7·44	8·63		3·30	4·68
†Mineral matters (ash)	4·19	4·45	3·56	4·18	5·70	4·84	4·32
	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	4·85	4·70	3·92	4·18	..	5·00	4·12
† Containing common salt	1·12	1·35	·85	1·50	1·46	1·23	1·38

The differences in the proportion of water and butter here are very large, though probably not greater than will be found in other descriptions of cheese on examining a considerable number of specimens. It is worthy of notice that the poorer the cheese in butter the more water it usually contains. Thus the first sample of double Gloucester, which contained 32½ per cent. of water, yielded 30 per cent. of butter (pure fat), whilst the third sample, containing nearly 39 per cent. of water, yielded 27 per cent., and the fifth sample, with nearly 41 per cent. of water, scarcely 23 per cent. of butter.

These analyses show that the distinction made between double and single Gloucester has no reference to quality. Indeed the first analysis in the table of the single Gloucester shows that thin cheeses are made which are as rich in butter as any of the best Cheddar and Cheshire cheeses. No. 1 and No. 6 in the list of double Gloucester, and Nos. 1, 2, and 4 in the table of single Gloucester, alike establish this equality. Nevertheless, the price which is paid for thin, *i.e.* single Gloucester of excellent quality, was only 70*s.* per cwt., whilst Cheddar, not richer in butter and containing nearly as much water, sold at 90*s.* per cwt. The latter, of course, was well-made and nicely flavoured cheese, and nearly four months old, whilst the single Gloucester was only two months old. Still, making every allowance for loss in weight on keeping for two months longer, the difference in the price at which both were sold, amounting to exactly 1*l.*, leaves a handsome balance in favour of a system which I have no doubt will come more and more into favour.

We have here again presented to us striking examples showing that the difference in the quality and price of the cheese is not dependent merely on the richness or poverty of the milk, but that the process of manufacture exerts a decided and direct influence on its value. Different plans now followed have unquestionably various degrees of merit, but in our present state of knowledge it would be premature to lay down any absolute rule.

LEICESTERSHIRE, WARWICKSHIRE, AND WILTSHIRE CHEESE.

Some excellent cheese is made in Leicestershire and Warwickshire, but the generality of the produce of these two counties does not rank equally high with Cheshire, Cheddar, or even Gloucester cheese.

Some parts of Wilts are celebrated for their rich pastures, and for an excellent delicate-flavoured kind of cheese. In other parts of the county a good deal of butter is made, and here, as in all districts where much butter is made and dairy-farms are small, the cheese produced is of an inferior character.

Whole-milk cheese, I believe, is not generally made in Wiltshire, although in North Wilts a good deal is sold as such in the market.

Wiltshire and Gloucester cheese is commonly coloured with annatto, whilst that made in Leicestershire and Warwickshire is mostly uncoloured.

The following Table shows the composition of some specimens from the three counties to which I have just referred:—

Composition of Leicestershire, Warwickshire, and Wiltshire Cheese.

	LEICESTER.		WARWICKSHIRE.			WILTSHIRE.		
	No. 1.	No. 2.	No. 1.	No 2.	No. 3.	No. 1.	No. 2.	No. 3.
Water	35·21	32·89	31·97	33·61	33·53	34·44	39·22	40·07
Butter	27·28	29·28	29·08	30·04	30·89	28·71	19·26	25·55
*Casein	27·93	29·06	27·43	29·70	28·19	29·00	34·22	26·81
Milk-sugar, lactic acid, and extractive matters ..	5·54	4·42	7·16	1·95	2·84	3·60	2·28	2·24
†Mineral matters (ash)	4·04	4·35	4·36	5·60	4·55	4·25	5·02	5·33
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	4·47	4·65	4·39	4·74	4·51	4·64	5·38	4·29
† Containing common salt	1·03	1·21	·72	2·78	1·12	1·03	·60	1·41

The first analysis was made of an uncoloured Leicestershire cheese, sold retail at 9*d.* per lb. The second was a much better specimen from the same county. The latter, it will be seen, is drier and richer than the former.

The difference in the composition of the three Warwickshire cheeses is not great. In all three the proportions of water, butter, and casein, do not vary more than 2½ per cent. The greatest difference is observable in the amount of salt used. In the second specimen we have nearly 3 per cent. of salt, a proportion far above the average, and the cheese was to a certain extent spoiled by this excess. I would direct special attention to this, which I know from experience is not a solitary instance. For no description of cheese should more than 2 lb. of salt per cwt. of cheese be used, and 1½ lb. per cwt. will, I believe, in most cases be sufficient. This was by no means a good cheese; it had a strong taste, and was sold as common Warwickshire cheese. This and the third were uncoloured, and the flavour of the latter, as well as its texture and shape, was very good indeed.

The first analysis was made of a coloured cheese which was sold as best Warwickshire; apparently it was an old and very much richer cheese than No. 2, but on analysis it was found actually to contain 1 per cent. less butter than the common cheese of the same name, thus giving another instance of the fact that good materials are often spoiled by unskilful management.

Of the three Wiltshire cheeses No. 1 was decidedly the best flavoured, and, as will be seen, also the richest. No. 2 and No. 3 contained too much water, showing that the whey had not been carefully pressed out, and when this has been the case the cheese is very apt to heave and to acquire a strong taste. No. 2 is very poor in butter, and, although not sold as skimmed-milk cheese, for all I know may have been made of skimmed milk.

SKIM-MILK CHEESE.

Milk varies so much in quality that in one dairy a better and richer cheese can be made from milk which has been skimmed than in another where only the evening milk is skimmed and added to the whole new morning's milk.

The following analyses clearly bring out this important practical fact, but they also show that, as a rule, skimmed milk does not produce a good cheese:—

Composition of Skim-milk Cheese.

	No. 1.	No. 2.	No 3.	No. 4.	No. 5.
Water	27·68	39·45	38·39	43·87	45·39
Butter	30·80	27·08	23·21	15·89	9·97
*Casein	35·12	30·37	28·37	28·93	33·12
Milk-sugar, lactic acid, and extractive matters	1·46	·22	6·80	6·47	6·39
†Mineral matters (ash)	4·94	2·90	3·23	4·84	5·13
	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	5·62	4·86	4·54	4·63	5·34
† Containing common salt ..	1·27	·23	·33	1·66	1·51

With the exception of No. 4, which was bought in a shop at Cirencester as skim-milk cheese at 7*d*. per lb., the other cheeses, the composition of which is here given, were either made under my direction or according to a plan with which I was made acquainted.

No. 1 it will be noticed, though made from skim-milk, is as rich in butter as good Cheshire cheese. It was rather more than six months old before it was analysed, when its quality was pronounced by several good judges to be excellent; superior, indeed, to most of the Gloucester cheese which I have ever tasted.

No. 2 and No. 3, though not equal to No. 1, after keeping for six months turned out very good cheeses indeed.

No. 4 it will be seen contained only 16 per cent. of butter, in round numbers, and nearly 44 per cent. of water. If such cheese can be sold at 7*d.* per lb. and butter at 1*s.* to 1*s.* 4*d.* per lb., I can well understand that it must pay a farmer to make nothing but skim-milk cheese and to convert all the cream into butter.

No. 5 was made of milk skimmed at least three times, and sold on the farm where it was made to the labourers at 3*d.* per lb. Such cheese cannot be kept for any great length of time, for it soon gets so hard and horn-like that a pickaxe must be used to break it into pieces.

AMERICAN CHEESE.

Of late years a good deal of cheese has been imported into England from America, some of which is by no means bad: indeed one or two specimens which came under my notice were excellent in quality. The majority, however, are inferior, and are sold at a low price, being generally badly made and deficient in flavour.

The following Table gives the composition of American cheeses :—

Composition of American Cheese.

	No. 1.	No. 2.	No. 3.	No. 4.
Water	27·29	33·04	31·01	38·24
Butter	35·41	33·38	30·90	26·05
*Casein	25·87	27·37	26·25	26·81
Milk-sugar, lactic acid, and extractive matters	6·21	2·82	7·43	3·64
Mineral matters (ash)	5·22	3·39	4·41	5·26
	100·00	100·00	100·00	100·00
* Containing nitrogen	4·14	4·38	4·20	4·29
† Containing common salt	1·97	·47	1·59	1·94

No. 1 was as nice a cheese as could be desired; in flavour it much resembled good Cheddar, and was found to contain even a higher proportion of butter and rather less water than good Cheddar.

The second cheese, though rich in butter, was retailed at 7*d.* per lb., and the third at only 6*d.* per lb. Both were deficient in flavour and badly made.

The fourth cheese was the worst of the four, and had to be sold at 5*d.* per lb. It was full of holes, badly made, and had a very strong smell. It was evident that the whey was not carefully pressed out in the making.

The examination of these and other American cheeses leads me to the conclusion, judging from our imports, that good materials are even more thoroughly spoiled on the other side of the Atlantic than in England.

Let me next direct attention to some of the principal mistakes which are not unfrequently committed in the manufacture of cheese. I have said in the beginning of this paper—1st, that cheese is sometimes spoiled even before it is separated from the milk; 2ndly, that it is yet more frequently spoiled in the act of making; and, lastly, that it is sometimes deteriorated by bad keeping after it has been made.

I.—PRACTICAL MISTAKES MADE IN THE MANUFACTURE OF CHEESE BEFORE THE CURD IS SEPARATED.

The inferior character, and especially the bad flavour, of cheese owes its origin in many cases to a want of proper care in handling the milk from which it has been made. Milk sometimes gets spoiled by dirty fingers before it passes into the pail. If the vessels in which the milk is kept in the dairy have been carelessly washed, and the milk-pails and cheese-tub have not been well scrubbed, but merely been washed out, and if especially the dairy-utensils have not been scalded with boiling-hot water, it is vain to expect that cheese of the finest quality can be made, let the milk be ever so rich in cream. The neglect of these simple but important precautions soon manifests itself in a dairy by a peculiar ferment which taints the whole milk, and afterwards affects the flavour and consequently the quality of the cheese. Cleanliness, indeed, may be said to be the first qualification of a good dairywoman.

The nature of every ferment is to produce in other matters with which it comes into contact certain chemical changes depending on its own character. Thus a little yeast produces in fermentable liquids large quantities of alcohol and carbonic acid; acid ferments containing acetic or lactic acid have a tendency to generate vinegar or lactic acid in other liquids. A small piece of putrefying meat in contact with a large mass of sound flesh soon spreads putrefaction over the whole mass; and other ferments act in a similar manner. Such ferments generally produce in other matters with which they are brought into contact changes similar to those which they themselves undergo. The disagreeable smell of dirty or badly cleaned milk-pails and cheese-tubs is due to a peculiar ferment, which is rapidly formed, especially in warm weather, when milk is left in contact with air and with the porous wood of the cheese-tub and milk-pails. In the rapid process of vinegar manufacture a weak alcoholic liquid is allowed to trickle through a barrel perforated all over with holes to admit the air, and filled with wood-shavings. If the temperature of the room in which the vinegar-casks are put up is sufficiently high, the alcohol, in trickling over these shavings when in contact with abundance of air, undergoes a complete transformation, and collects rapidly at the bottom of the cask as vinegar. But such a change does not take place if the alcoholic liquid is left for ever so long in a clean cask filled with such a liquid. Contact with air, subdivision of the liquid into drops, and the presence of the porous wood-shavings, are necessary for the transformation. These casks do not at first produce vinegar as rapidly as after they have been in use for some time and become thoroughly soaked with vinegar-ferment. And this is another peculiarity of all ferments, that, under favourable circumstances, they reproduce themselves from other materials in immense quantities. Thus fresh and active yeast is generated in great abundance in fermenting malt-liquor, whilst the original yeast employed in brewing is more or less decomposed and becomes what is called inactive yeast. These chemical facts, well-known to the manufacturers of vinegar and to the intelligent brewer, have a direct bearing on cheese-making.

At the very beginning of her operations a good dairywoman unconsciously carries on a steady and constant battle with these remarkable ferments, and it is very interesting to the chemist to see her proceed in the most rational and philosophical manner.

No milk is admitted into the cheese-tub before it has been carefully strained through a cloth, lest a little bit of a dead leaf or any similar matter, accidentally blown into the milk in its passage from the milking-place to the dairy, should spoil the flavour of the cheese. No sooner has the cheese left the tub than she begins to pour scalding water into it, to scrub it, and to make it as clean and sweet as possible. In good dairies no utensil is allowed to remain for a moment dirty, but hot water and clean brushes are always close at hand to scrub the pails and make them almost as white as snow. The dairywoman probably knows nothing about the nature of the ferment, which is rapidly formed when a little milk is left at the bottom and adhering to the sides of the wooden milk-pails; she is unconscious that here, as in the vinegar process, the conditions most favourable to chemical change are present, and that the sugar of the milk, in contact with plenty of air and porous wood, is rapidly changed into lactic acid, whilst at the same time a peculiar milk-ferment is produced; all this may be a perfect mystery to her, but, nevertheless, guided by experience, she thoroughly avoids everything that favours the production of ferment, or taint, as she calls it, by leaving no vessel uncleaned, by scalding all that have been in use with boiling water, and if ever so little milk be accidentally spilt on the floor of the dairy, taking care that it is at once removed, and the spot where it fell washed with clean water.

It is, indeed, surprising how small a quantity of ferment taints a large quantity of milk. The most scrupulous cleanliness therefore is brought into constant play by a good dairywoman, who never minds any amount of trouble in scalding and scrubbing her vessels, and takes pride, as soon as possible after her cheeses are safely lodged in the presses, in having the dairy look as clean and tidy as the most fastidious can wish. It is a pleasure to see one of these hardworking women at work, especially as such a sight is not often witnessed, slovenly dairymaids being unfortunately in a majority. This being the case, we should encourage the use of tin pails and tin or brass cheese-tubs. Wooden pails, &c., are very good in the hands of a tidy dairymaid, but not otherwise. There is much less labour in thoroughly cleaning a tin or brass vessel than a wooden one, and boiling-hot water is not then required. Wood being a porous material inevitably absorbs more or less of the milk; tin or brass does not. The milk thus absorbed cannot be removed by simple washing. Inasmuch as all ferments are destroyed by water at the temperature of 212°, it is important to ascertain that the water is perfectly boiling; and yet it is strange that few women comparatively speaking, though they may have spent many years in the kitchen, know to a certainty when the kettle is really boiling. This remark applies to some educated as well as uneducated females. They often mistake the singing noise of the tea-kettle accompanied by a certain amount of vapour for a sign that water is in a state of ebullition; so that if you would drink good tea you must be careful to whom you trust to make it.

In some dairies of Cheshire it is customary to paint the wooden cheese-tubs in the interior. I confess I do not like this at all; lead-paint is not a very desirable thing to be used in connection with cheese; and I am glad to find that the best dairy-farmers are decidedly adverse to this proceeding.

Milk sometimes gets tainted by the close proximity of pigstyes or waterclosets, or by underground drains. Not very long ago I visited a dairy in Wiltshire, where every possible care was taken by the dairymaid to produce good cheese; but I noticed a peculiarly disagreeable smell in the dairy, and on making inquiries I found that there was a cesspool close at hand, which certainly tainted the milk, and rendered the making of good cheese an impossibility. In the third place, I would notice that if dairies are not well situated,—if they have, for instance, a south aspect, so that a proper low temperature in summer cannot be maintained,—the milk is apt to turn sour and to make sour cheese. It is important, therefore, that dairies should be built with a northern aspect.

These are some of the circumstances that spoil the cheese even before it is separated from the milk. The remedies are obvious. It is only with respect to the latter point,—that of milk getting sour, that I would offer a few observations. If the situation of a dairy is bad, and a new dairy cannot be erected, we should employ all possible means to prevent the milk from getting warm. We should keep it in shallow tins or leads, or, better still, as I have seen in some parts of Somersetshire, in shallow tin vessels with a double bottom, through which cold water may be run during the warm part of the season. By this means we can keep the milk at a considerably lower temperature than we should otherwise be able to do. Having seen nitre and salt used with great advantage to prevent cream turning sour, I would further suggest that they might probably be found serviceable in the same manner for the keeping of milk if used in moderate quantities. Some people, however, maintain that milk requires to become sour to a certain extent before it can be properly made into cheese. A great deal has been said and written with respect to the great utility to the dairyman of an instrument by means of which the amount of acid in sour milk might be accurately and readily determined. A careful study of the action of rennet on milk, however, has led me to the conclusion that the more carefully milk is prevented from getting sour, and, consequently, the less opportunity there is for the use of an acidometer, the more likely the cheese is to turn out good. Indeed, the acidometer appears to me a useless instrument,—a scientific toy which can never be turned to any practical account. If by accident the milk has become sour, the fact soon manifests itself sufficiently to the taste. An experienced dairymaid will even form a tolerably good opinion of the relative proportions of acid in the milk on different days and arrange her proceedings accordingly. Moreover, the knowledge of the precise amount of acid in the milk does not help us much. When milk has turned sour, the best thing to do is to hasten on the process of cheese-making as much as possible.

II.—PRACTICAL FAULTS COMMITTED DURING THE MAKING OF CHEESE.

1. Under the second head I would observe, first, that sufficient care is not bestowed upon noticing the temperature at which the milk is "set," or "run," as it is called in Gloucestershire. Thermometers, indeed, are seldom in use. Even where they are hung up in the dairy, they are more frequently regarded as curious but useless ornaments than trustworthy guides, and therefore are seldom put into requisition. In fact, most dairymaids are guided entirely by their own feelings; and as these are

as variable as those of other mortals, the temperature of the milk when it is "set" (that is, when the rennet is added) is often either too high or too low. They mostly profess to know the temperature of the milk to a nicety, and feel almost insulted if you tell them that much less reliance can be placed on the indications of ever so experienced a hand than upon an instrument which contracts and expands according to a fixed law, uninfluenced by the many disturbing causes to which a living body is necessarily subject.

It is really amusing to see the animosity with which some people look upon the thermometer. It is true there are not many dairies in which it may not be found; but if we took pains to ascertain in how many of these it is in constant use, I believe that the proportion would not exceed 5 per cent. This is a great pity, for a tolerably good one can be now bought or replaced at a trifling cost.

I have spoken frankly but unfavourably of the acidometer. With equal frankness I express my regret that the use of the thermometer is not more general, as I believe it is indispensable for obtaining a uniformly good product.

If the temperature of the milk, when the rennet is added, is too low, the curd remains too soft, and much difficulty is experienced in separating the whey. If, on the other hand, the temperature is too high, the separation is easily effected, but the curd becomes hard and dry. The amount of water, which is left in the curd when it is ready to go into the cheese-presses, to some extent indicates whether a proper temperature has been employed. When this has been too low, the curd will contain more than 50 per cent. of moisture; when too high, sometimes less than 36 per cent. How variable is this proportion of water (chiefly due to the whey left in the curd) will appear from the following determinations made in the same dairy on four following days:—

Amount of water in Curd when ready to go into the vat.

Percentage of water in	1st Cheese	41·53
,, ,,	2nd Cheese	41·49
,, ,,	3rd Cheese	38·20
,, ,,	4th Cheese	35·80

In this dairy the thermometer was not in daily use, and the heat employed in making the fourth cheese was evidently too high, for in good Cheddar when ready for sale the amount of moisture is hardly less than in this curd when put into the vat. The cheese from these four specimens of curd was made according to the Cheddar system. Five other specimens gave the following proportions of water:—

Percentage of water in Curd when ready to go into the vat.

1st specimen, percentage of water	59·67
2nd	56·93
3rd	53·40
4th	52·80
5th	50·01

These were produced according to the custom of Gloucestershire and Wiltshire, at a temperature varying from 72° to 75°; but, not having taken the observations myself, I am unable to speak more precisely. This much, however, is quite certain, that the lower temperature at which the cheese is usually made in Gloucestershire and Wiltshire, when compared with the Cheddar system, fully accounts for the large proportion of water that is found in curd made after the Gloucester or Wiltshire fashion. The cheese made from these five curds was best at the dairy in which I found the lowest proportion of water in the curd. The differences here noticed, however, are due not only to the higher or lower temperature employed, but also to the trouble and the time bestowed in breaking up the curd. Other circumstances being equal, the more thoroughly curd is broken up, and the longer time is occupied in this process, the more whey will pass out, and the better the cheese is likely to become. I consider 50 per cent. of moisture rather under the average, and 53 to 54 per cent. a proper quantity of water to be contained in the curd when it is vatted to form a thin or moderately thick cheese. In making thick cheese, it should not have more than 45 per cent. of moisture. 57 or 59½ per cent., the proportions of water in the first and second specimens of curd, are too high even for a thin cheese.

Curd being a very peculiar and delicate substance, which is greatly affected by the temperature to which it is exposed, I directed some special experiments to the investigation of its properties. First, I coagulated new milk at 60° Fahrenheit, and found that at such a low temperature it took three hours to complete the process, though the rennet was added in a very large excess. The curd remained tender, and the whey could not be properly separated. Milk at 65° F., on addition of rennet, curdled in two hours; but the curd, as before, remained tender, even after long standing. At 70° to 72° F. it only took from one-half to three-quarters of an hour, and the curd now separated in a more compact condition. The process was more expeditious, and the curd in better condition, when the temperature ranged from 80° to 84°. At 90° the rennet curdled the milk in twenty minutes, and at 100° F. an excess of rennet coagulated the milk in about a quarter of an hour, separating the curd in a somewhat close condition. By heating the curd in the whey to 130° F., I find it gets so soft that it runs like toasted cheese, and becomes quite hard on cooling. The limits of temperature between which curd can be improved or deteriorated in texture are therefore not very wide. The exact temperature to be adopted depends upon the description of cheese that is wanted—a lower range, *e. g.* 72° to 75°, being desirable when a thin cheese is made; whilst for thick cheese, such as Cheddar, it should vary from 80° to 84°, 80° being best adapted to warm weather, and a little increase in the heat desirable in the cold season. After a portion of the whey has been separated, it is advisable to scald the curd and to raise the temperature of the whole contents of the cheese-tub to 95° or 100°, but certainly not higher. I have seen much injury done to cheese by using too high a temperature in the making.

Secondly, apart from this influence of temperature, cheeses are often deteriorated by the frequently imperfect separation of the whey from the curd; by hurrying on too much the operation of breaking; and by too great an anxiety to get the curd vatted. The whey requires time to drain off properly, and hence the Somersetshire plan is a good one—to expose the curd for some time to the air, after it has been sufficiently broken and been gathered again and cut in slices of moderate size. A great deal of whey runs off, and the curd, moreover, is cooled, and runs less risk of heating too much after it leaves the presses.

When the whey has been ill-separated from the curd, no amount of pressure will squeeze out the excess of whey, which then causes the cheese to heave and blister, and imparts to it a somewhat sweet and at the same time strong taste. This taste is always found in an ill-shaped cheese, which bulges out at the sides, the interior of which will be found to be full of cavities, and far from uniform in texture. Many cheeses imported from America are evidently spoiled in this way, for they are often full of holes, have a strong smell, and contain too much moisture—sure indications that the whey was not properly separated. The sweet taste is given to the cheese by part of the sugar of milk, of which a good deal is found in whey; another portion of this, on entering into fermentation, forms, amongst other products, carbonic-acid gas, which, in its endeavour to escape, heaves up the semi-solid curd, and causes it to blister, producing the numerous apertures of considerable size which are found in badly-made cheese. If the cheese is coloured with annatto, the excess of whey at the same time causes a partial separation of the colouring matter, so that more colour collects in some parts than in others, and the cheese assumes that unequal condition in which it is called tallowy. A uniform colour and perfect shape are therefore to a certain extent indications of a superior quality; whilst mottled, mis-shaped cheese, almost invariably proves tallowy, and in flavour sweet when young, and very strong when older. The danger of leaving too much whey in the curd is especially great in warm weather, for it is then that the fermentation of the sugar of milk proceeds most rapidly.

There are three precautions to be taken against an undue proportion of whey in the curd:—

1. Plenty of time should be allowed for the whey to drain off properly.
2. Before the rennet is added, the milk should be heated to a temperature of 72° to 75° for thin, or of 80° to 84° for thick cheese.
3. The best preventive is the practice of *slip-scalding*, as it is called. The operation, which is highly recommended by Mr. Harding, one of our best Cheddar cheese-makers, and extensively practised in Somersetshire, consists of heating a portion of the whey, and adding it or hot water to the curd, whilst it is still covered with some of the whey, until the temperature of the whole be raised to from 95° to 100°. This has the effect of making the curd run together into a much smaller compass, and enables the dairymaid to draw off the whey more perfectly and with very much less trouble than by the common method. If well done, no injury, but every advantage, results from this practice. The curd, when slip-scalded, settles down very readily, and its closer condition implies that it does not contain so much whey as it did before scalding. Hence no skewers are required to drain off the whey from cheese that has been slip-scalded, and a great deal of subsequent labour and anxiety is avoided by this simple process. Slip-scalding, however, ought to be carefully performed, and the hot whey or water be poured slowly upon the curd by one person, whilst another stirs up the contents of the cheese-tub, so as to ensure a uniform temperature throughout. The necessity for these precautions will be best understood from the following explanation:—When curd, broken up and cut into slices, is suddenly and incautiously scalded with boiling water, the outer layer of the slices first melts and then becomes hard, enveloping the interior, which remains quite soft and full of whey. This hard covering acts like a waterproof wrapper, and prevents the escape of the whey, however strongly the curd may be pressed afterwards; hence the importance of a gradual and careful admixture of the hot whey. Better still is it to employ one of Coquet's jacketed tin or brass cheese-tubs, into the hollow

bottom of which steam may be let in, and the curd and whey be raised by degrees to the desired temperature. This utensil is to be strongly recommended to all who adopt the Cheddar mode of cheesemaking in their dairies.

Cheese is also spoiled by breaking up the curd too rapidly and carelessly. This delicate substance requires to be handled by nimble and experienced fingers, and to have a great amount of patient labour bestowed upon it. Dairymaids, as a class, break up the curd in far too great a hurry. In consequence of their careless treatment some portions of the curd are broken into fragments so small that they pass into the whey when this is drawn off, whilst others are not sufficiently broken up and remain soft. The result is, that the curd is not uniform in texture, and that less cheese and of inferior quality is produced than when the curd is first cut very gently into large slices and then broken up by degrees either by hand or machinery into small fragments.

The whey which separates from curd that has been gently broken up is as bright as Rhenish wine, provided the milk has been curdled at the proper temperature by a sufficient quantity of good rennet. On the other hand, if the curd has been broken up carelessly in too great a hurry, the whey is more or less milky, and separates on standing a large quantity of fine curd of the choicest character, for this fine curd is very rich in butter. Thus the best part of the curd, instead of becoming incorporated with the cheese, finds its way into the whey leads. Be the curd, however, broken up ever so gently, and the whey drawn off ever so carefully, the latter always throws up, on standing, some cream, which it is worth while to make into butter. But the quantity of whey-butter made in good dairies is very insignificant in comparison with that produced where less attention is paid to the breaking of the curd. I know it to be a fact, that in some dairies four times as much whey-butter is made as in others. Where much whey-butter is made, the cheese is seldom of first-rate quality. Believing that this is a matter of some importance, I have visited many dairies, and repeatedly watched dairymaids breaking the curd, and noticed the gentle and patient manner in which a clever woman goes to work, and the hurried and dashing proceedings of a slovenly girl. On these occasions I have taken samples of the whey, and submitted them afterwards to analysis. The results, as recorded in the following tables, show how much the whey of different dairies varies in chemical composition as well as in physical character:—

Composition of Whey.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Water	92·95	92·65	92·60	92·75	92·950
Butter (pure fatty matters) ..	·65	·68	·55	·39	·490
*Nitrogenous substances (casein and albumen)	1·20	·81	·96	·87	1·425
†Milk-sugar and lactic acid ..	4·55	5·28	5·08	5·13	4·491
Mineral matters (ash)	·65	·58	·81	·86	·644
	100·00	100·00	100·00	100·00	100·000
* Containing nitrogen	·19	·13	·15	·14	·228
† Containing free lactic acid .	·48	·41	·36	·41	·120

	No 6.	No 7.	No. 8.	No. 9.	No. 10.
Water	92·95	93·150	92·95	93·30	93·25
Butter (pure fatty matters) ..	·29	·546	·24	·31	·26
*Nitrogenous substances (casein and albumen)	1·01	1·056	·81	1·01	·91
†Milk-sugar and lactic acid ..	5·08	4·662	5·27	4·68	4·70
Mineral matters (ash)	·67	·586	·73	·70	·88
	100·00	100·000	100·00	100·00	100·00
* Containing nitrogen	·16	·169	·131	·16	·148
† Containing free lactic acid ..	·54	None.	·39	·41	·41

	No. 11.	No 12.	No. 13.	No. 14.	No. 15.
Water	92·85	93·35	92·70	93·15	93·10
Butter (pure fatty matters) .	·29	·25	·31	·14	·14
*Nitrogenous substances (casein and albumen)	·93	·91	·96	·91	·76
†Milk-sugar and lactic acid) ..	5·03	5·00	5·31	5·06	5·31
Mineral matters (ash)	·90	·49	·72	·74	·69
	100·00	100·00	100·00	100·00	100·00
* Containing nitrogen	·151	·148	·15	·148	·123
† Containing free lactic acid	·60	·43	·40	·48	·46

When it is remembered that milk of good quality contains from 3½ to 4 per cent. of butter, it will be readily seen that where samples of whey contain more than ½ per cent. of butter, the cheese is deprived of a very considerable portion of its most valuable constituent, and that its quality must therefore depend in a great measure on the care with which the curd is broken up and the manner in which the whey is drawn off. In some samples the amount of butter is so trifling, that it is not considered worth the trouble to gather the cream and to make whey-butter. In the dairies in which this happy state of things exists excellent cheese is made. When the whey first separates from the curd it is always more or less turbid, but by degrees it becomes clearer; and if sufficient time is allowed, and it is then tapped off without disturbing the curd, it runs off almost as clear as water. By this means nearly the whole of the butter may be retained in the cheese. In order to place this beyond a doubt, I examined the whey which Mr. Keevil, the inventor of the excellent cheesemaking apparatus which bears his name, allowed me to take on the occasion of a visit which I recently paid to his dairy-farm at Laycock, near Chippenham. One sample of whey was taken at the stage in which it was usually tapped off in Mr. Keevil's dairy; the second when the whey had become a little brighter, about ten minutes after the first; and the third about twenty minutes after the first. It then was as clear as water. These three samples when analysed gave the following results:—

Composition of Whey taken at 3 different periods.

	No 16. 1st Sample.	No. 17. 2nd Sample, taken 10 minutes after 1st Sample	No 18. 3rd Sample, taken 20 minutes after 1st Sample.
Water	92·90	93·25	93·55
Butter (pure fat)	·18	·18	·03
*Albuminous compounds	·94	·94	·94
Milk-sugar and lactic acid .. .	5·30	5·03	4·82
Mineral matters (ash)	·68	·60	·66
	100·00	100·00	100·00
* Containing nitrogen	·15	·15	·15

The two first samples are almost identical in composition; they both contain very little butter, but, small as that quantity is, it can be further reduced to a mere trace by letting the whey stand a little longer. In practice it may for other reasons not be desirable to let the whey stand at rest quite so long as the third sample stood; and a dairymaid may congratulate herself when she succeeds in breaking up the curd so carefully that the whey contains as little butter as that made under Mr. Keevil's personal direction and excellent management.

It may perhaps be supposed that the successful manner in which the butter is retained in the cheese in Mr. Keevil's dairy is entirely due to the use of his patent apparatus, and that by its introduction any dairymaid may be enabled to make good cheese. But this supposition is not correct. Keevil's apparatus, useful and good as it is in many respects, is no safeguard against carelessness. Cheese is spoiled with, as well as without it.

It does not supersede patience and skill, but its merit consists in saving a great deal of hard labour and time. Beyond this, I may say, without disparagement to his ingenious contrivances for breaking the curd, straining off the whey, and other appliances, that it effects nothing which may not be done by hand. But this saving of time and hard labour is a great merit in an apparatus which can be bought at no great cost. Where from 30 to 40 milking-cows are kept, it may be safely recommended; in smaller dairies there may not be sufficient use for it. Having made frequent trial of Keevil's apparatus, I am anxious that its true merits should be known, but no unreasonable expectations be entertained. It has been said that it makes more and better cheese than can be made by hand. My own opinion is, that it makes neither more or less, neither better or worse cheese than a skilful dairymaid will make by hand, and that a careless one is as likely to spoil her cheese when using this apparatus as when making it according to her own fashion.

Some of the very best and some of the very worst of cheeses which I have examined were made in dairies where Keevil's apparatus is in daily use. The superior character of the one cheese is as little a proof of the merits of Keevil's apparatus as is the bad quality of the other an evidence against it.

Again, I may point to the composition of the whey analyses marked No. 2, No. 3, No. 8, and No. 14, in the preceding large table, and to the three whey analyses to which I have just referred:—

No. 2, containing ·68 per cent. of butter, was made from curd taken by Keevil's apparatus.
No. 16, containing ·18 per cent. of butter, was made from curd taken by Keevil's apparatus.
No. 18, containing ·03 per cent. of butter, was made from curd taken by Keevil's apparatus.

Here, then, we have two samples of whey very poor in butter, and one sample containing more butter than any of the seventeen which I analysed. On the other hand:—

No. 3, containing ·55 per cent. of butter, was made from curd broken by hand.
No. 8, containing ·24 per cent. of butter, was made from curd broken by hand.
No. 14, containing ·14 per cent. of butter, was made from curd broken by hand.

Here, again, we have two well-separated samples of whey, and one rich in butter, all three being made from curd broken by hand.

Passing on from the loss of butter to that in the curd itself, I find that, although no doubt some fine curd is lost when the whey is very milky in appearance, yet as a rule this loss is small in most dairies. Indeed, my analyses prove positively that whey seldom contains much casein or curd which might be retained by ever so careful filtration. I have filtered whey from good milk through the finest blotting-paper, and obtained it as bright as crystal. On heating the perfectly clear whey to the boiling-point, however, a considerable quantity of a white, flaky substance, resembling in every respect albumen, or the white of egg, made its appearance. Collected on a filter, washed with distilled water, dried at 212° F., and weighed, this albuminous or curdlike substance amounted on the average to about ·9 or nearly 1 per cent. in good milk; in very rich milk there may be a little more, in poor a little less. This albuminous matter is contained in the whey in a state of perfect solution, and differs from casein or curd in not being coagulated by rennet. I have called it an albuminous matter, because, like albumen, it separates in flakes from the whey at the temperature of boiling water. Any one may prove the existence of this substance, which, however bright the whey may be, it invariably deposits in abundance at the boiling-point.

Assuming, then, ·9 to be the average proportion of this albuminous matter in whey, and deducting this proportion from the total amount of nitrogenized substances in the eighteen samples of whey, we obtain the amount of curd held in *mechanical* suspension. Thus we get for

No. 1 whey	·30 per cent. of curd, held in a state of mechanical suspension.
No. 2, 4, 8, and 15 whey	none.
No. 3 and 13 whey	·06 per cent. of curd, held in a state of mechanical suspension.
No. 5 whey	·525 per cent. of curd, held in a state of mechanical suspension.
No. 6 and 9 whey	·11 per cent. of curd, held in a state of mechanical suspension.
No. 7 whey	·156 per cent. of curd, held in a state of mechanical suspension.
No. 10, 12, and 14 whey	·01 per cent. of curd, held in a state of mechanical suspension.
No. 11 whey	·03 per cent. of curd, held in a state of mechanical suspension.
No. 16, 17, and 18 whey	·04 per cent. of curd, held in a state of mechanical suspension.

Thus only in one sample out of eighteen there was about $\frac{1}{2}$ per cent. of curd held in mechanical suspension, and one sample containing $\frac{3}{10}$ths per cent., all the other samples, practically speaking, containing no suspended curd. Thus it is not so much the curd as the butter which is lost when whey is badly separated from the curd.

4. When the curd has become sufficiently consolidated and is ready to be vatted, it is crumbled down into small fragments. For this operation every dairy should be furnished with a curd-mill, a simple and inexpensive contrivance, which saves much labour, and produces, generally speaking, a more uniform material than the hand.

5. Cheese is also spoiled occasionally by badly made rennet, that is, rennet which is either too weak or has a disagreeable smell. In the one case the curd does not separate completely, and that which separates remains tender; in the other the milk is tainted, and the flavour of the cheese is affected.

The rennet used in different parts of England varies exceedingly in strength and in flavour. Even in the same locality the usage differs on adjacent farms. Although I have in my possession some dozens of rennet recipes, which were given to me by experienced dairymaids, each as the very best, I shall not give a single receipt for making rennet, as my object is rather to elucidate chemical principles than to prescribe details; and also because, as long as the smell of the rennet is fresh, and a sufficient quantity is used, it matters little, in my opinion, how it is made.

The ordinary practice in Cheshire is to make rennet fresh every morning by taking a small bit of dried skin, infusing it in water, and using this infusion for one day's making. In Gloucestershire and Wiltshire a supply is made from the pickled vells, which lasts for two or three months. Generally the rennet is made in these counties twice in the season. I have had a good deal of discussion with practical men respecting the comparative merits of these two methods. The Cheshire farmers almost unanimously object that the rennet does not keep well when made in any quantity of pickled vells. This, however, is quite a mistake. I have in my possession some rennet which is as nicely flavoured now as it was some nine months ago, when it was made. It has, of course, a peculiar animal odour, but nothing approaching a putrid smell. The spices which are used in some localities, such as cloves and lemons, tend very much to keep the rennet in a good condition and give it an agreeable flavour. The objection, then, of the Cheshire farmers, that rennet, when a supply is made, does not keep, and spoils the flavour of cheese, is certainly untenable. I am much inclined to consider the practice of Gloucestershire and Wiltshire, of making a considerable supply of rennet, a good one; for, when once the strength of the rennet has been ascertained, it is merely necessary to take the proper quantity, one or two cupfuls, to produce the desired effect with certainty; whereas, when the rennet is made day by day, there is not the same certainty of obtaining an infusion of uniform strength.

Scientific and practical writers on milk have stated that the casein is held in solution by a small quantity of alkali; that when in warm weather milk curdles, lactic acid, which is always found in sour milk, is formed from a portion of the sugar of milk; and this lactic acid, by neutralizing the alkali which holds the casein in solution, causes its separation from the milk. Rennet is supposed to act as a ferment, which rapidly converts some of the sugar of milk into lactic acid. Whether, therefore, milk coagulates spontaneously after some length of time, or more rapidly on the addition of rennet, in either case the separation of the curd is supposed to be due to the removal of the free alkali by lactic acid.

This theory, however, is not quite consistent with facts. The casein in milk cannot be said to be held in solution by free alkali; for, although it is true that milk often has a slightly alkaline reaction, it is likewise a fact that sometimes perfectly fresh milk is slightly acid. We might as well say, therefore, that the casein is held in solution by a little free acid, as by free alkali. Newly drawn milk, again, is often perfectly neutral; but, whether milk be neutral, or alkaline, or acid, the casein exists in it in a state of solution, which cannot, therefore, depend on an alkaline reaction. We all know that milk, when it turns sour, curdles very readily. It is not the fact that *a good deal of acid curdles milk* which I dispute, but the assumption that the casein in milk is held in solution by free alkali. The action of rennet upon milk, then, is not such as has been hitherto represented by all chemists who have treated of this subject. Like many other animal matters which act as ferments, rennet, it is true, rapidly induces the milk to turn sour; but free lactic-acid, I find, makes its appearance in milk *after* the curd has separated, and not simultaneously with the precipitation of the curd. Perfectly fresh and neutral milk, on the addition of rennet, coagulates, but the whey is perfectly neutral. I have even purposely made milk alkaline, and yet succeeded in separating the curd by rennet; and, what is more, obtained a whey which had an alkaline reaction.

What may be the precise mode in which rennet acts upon milk, I do not presume to explain. I believe it to be an action *sui generis*, which as yet is only known by its effects. We at present are even unacquainted with the precise chemical character and the composition of the active principle in rennet, and have not even a name for it. Finding the effect of rennet upon milk to be different from that which I expected, I made a number of experiments, which may here find a place.

1*st Experiment.*—To a pint of new milk, slightly alkaline to test-paper, and of 60° Fahr., ¼ ounce of rennet was added.

Result: No coagulation after 3 hours.

Another ¼ ounce of the same rennet was then added.

Result: The milk coagulated 1 hour after this addition, but the casein was by no means well separated, and remained tender and too spongy, even after 24 hours. The whey was *slightly alkaline.*

2nd Exp.—To another pint of milk, neutral to test-paper, I added ½ ounce of the same rennet. The temperature of the milk was 60°, as before.

Result: The curd separated (though imperfectly) after 3 hours. The whey was *neutral.*

N.B.—It will be seen that the curd separated more readily from milk which was neutral, than from that which was alkaline.

3rd Exp.—To 2 pints of skimmed milk (24 hours old), and very slightly acid, I added ½ ounce of rennet. Temperature of milk 59° Fahr.

Result: Curd separated in 2 hours; reaction of whey the same as that of the milk.

Thus, if milk is slightly sour, rennet separates the curd more readily than when it is neutral, though the temperature may be low.

4th Exp.—To 1 pint of milk, slightly alkaline, and heated to 82° Fahr., ¼ ounce of rennet was added.

Result: The milk coagulated in 20 minutes; the whey was slightly alkaline.

5th Exp.—To 1 pint of milk heated to 100°, and neutral on reaction, ½ ounce of rennet was added.

Result: Milk coagulated in ¼ hour; whey perfectly neutral.

6th Exp.—Added to 1 pint of milk ¼ ounce of rennet. The temperature of milk was 110°; its reaction alkaline.

Result: Milk coagulated in 10 minutes; the whey was alkaline.

7th Exp.—Milk was raised to 120° Fahr., and ¼ ounce of rennet added to 1 pint of milk, which was slightly alkaline to test-paper.

Result: Milk coagulated in 10 minutes; the whey had the same reaction as the milk.

8th Exp.—1 pint of milk was heated to 130°, and ¼ ounce of rennet added.

Result: Curd separated in 20 minutes; whey had the same reaction as milk.

The experiment was repeated, and found correct.

It will thus appear that too high a temperature is not so favourable to the coagulation of the milk as a less elevated one. The separation, which at 120° took place in 10 minutes, at 130° occupied 20 minutes.

9th Exp.—Heated 1 pint of milk to 150°, added ¼ ounce of rennet.

Result: Milk did not coagulate after 24 hours.

10th Exp.—Heated milk to 140°, added rennet.

Result: No coagulation.

11th Exp.—Heated milk to 135°, added rennet.

Result: No coagulation took place, even after 3 hours. I then added another ¼ ounce; the milk by this time had cooled down, and the fresh quantity of rennet caused the separation of curd in less than 20 minutes.

Thus, at 120°, milk coagulates most readily; at 130°, it takes a somewhat longer time; and at 135°, and upwards, it ceases to coagulate.

12th Exp.—Heated 1 pint of milk to boiling-point, added ¼ ounce of rennet.

Result: No curd had separated when examined, after 24 hours' standing.

13th Exp.—Heated another pint of milk to boiling-point, and added ¼ ounce of rennet.

Result: Milk did not coagulate after 24 hours. I then added a little more fresh rennet to the cooled milk, and again gently heated it, when the curd separated in less than ½ hour.

Thus the temperature of boiling water, and even a much lower heat, destroys the action of rennet, but does not so permanently change the casein of milk that it cannot be separated.

The whey in the last experiment, again, was neutral, like the milk.

14th Exp.—To 1 pint of fresh milk I added 10 grains of carbonate of potash, raised the temperature to 88° Fahr., and added ¼ ounce of rennet.

Result: Curd separated in ½ hour. The milk and the whey were strongly alkaline. After 24 hours the whey was neutral, and then it became acid by degrees.

15th Exp.—To 1 pint of milk I added 20 grains of carbonate of potash, heated to 90° Fahr., and added ¼ ounce of rennet.

Result: The curd separated in ½ hour, but not so perfectly as in the preceding experiment, and in a softer condition. The whey was more milky in appearance, and strongly alkaline. Examined after 24 hours' standing, it was found to be neutral; after a lapse of 2 days, it was acid.

Even a considerable quantity of an alkali, therefore, does not prevent the coagulation of milk by rennet.

16*th Exp.*—To another pint of milk I added an unweighed quantity of potash heated to 84°, and then ½ ounce of rennet.

Result: No coagulation took place.

Much more alkali was used in this experiment than in the two preceding; an excess of alkali, therefore, prevents the separation of curd by rennet.

17*th Exp.*—To some milk, sufficient tartaric acid was added to make it distinctly acid.

Result: No coagulation took place in the cold. On the application of heat, the milk coagulated but imperfectly.

18*th Exp.*—To another portion of milk I added a good deal of tartaric acid.

Result: The milk coagulated after some time, but imperfectly; on raising the temperature, more curd fell down.

In order to precipitate the casein from milk by tartaric acid, it is thus necessary to add a very large excess of acid, and at the same time to raise the temperature of the milk.

These experiments prove thus—

a.—That the action of rennet on milk is not the same as that of an acid, inasmuch as rennet coagulates new milk without turning it sour in the least degree.

b.—That rennet can precipitate curd from milk, even when purposely made alkaline.

c.—That the whey of milk, when produced from perfectly sweet or neutral milk, is at first perfectly sweet or neutral, but rapidly turns sour. If made from milk having an alkaline reaction, the whey at first is alkaline; when from milk slightly acid, the whey likewise is slightly acid.

d.—That rennet ceases to coagulate milk at about 135°, and upwards.

e.—That the action of rennet upon milk is more energetic when the milk is slightly acid. This, perhaps, is the reason why some persons recommend putting some sour whey into the milk before or after adding the rennet.

f.—That an excess of alkali prevents the coagulation of milk by rennet.

g.—That an excess of acid coagulates milk, but not perfectly in the cold.
h.—That a moderate amount of acid does uot coagulate milk in the cold, and imperfectly at an elevated temperature.

6. Cheese, again, is sometimes spoiled when bad annatto is employed as a colouring matter. Annatto at the best is a nasty, disagreeable smelling substance; it would be well if it were banished altogether from the dairy. But, so long as a good many people will prefer coloured to uncoloured cheese, annatto will be employed for the purpose of imparting a more or less deep yellow colour.

The annatto of commerce is derived from the Orlean-tree (*Bixa orellana*). The seeds and pulp of this tree appear to contain two colouring matters; one, in a pure state, is orange-red, and is called bixin; the other is yellow, and called orellin. These colouring matters are insoluble in water, but dissolve readily in alkalies, and also in fixed oils and fats. Solid annatto, the annatto cake of commerce, is a preparation, which contains, besides the pure colouring matter, a great deal of potash or soda, carbonate-of-lime, pipeclay, earthy matters, and rubbish of various kinds. Soap, train-oil, and other disagreeable smelling and tasting matters are often used in preparing annatto cake. Hence the annatto of commerce is often a most nauseous material, which, when put into the cheese-tub, is apt to give to the cheese a bad taste and an unsightly colour. Far superior to this annatto, and more handy in its application, is the liquid annatto, which is mainly an alkaline solution of the pure colouring matter of the Bixa orellana. An excellent solution of that description is manufactured by Mr. Nichols, of Chippenham, which is perfectly clear, has a bright yellow colour, and is free from any of the obnoxious and disagreeable substances which are frequently mixed up with annatto cake.

7. *In the next place, I would observe that cheese is occasionally spoilt if too much salt is used in curing it.* Salt is a powerful antiseptic, that is, it prevents fermentation; hence we use it for pickling beef and hams. A certain amount of salt is necessary, not so much for giving a saline taste, as for keeping in check the fermentation to which cheese, like other animal matters, is liable. If no salt were used the cheese would putrefy, and acquire a very strong taste and smell, at least when made in the ordinary way. When an extra quantity of cream is put to the milk, it is not necessary, or even desirable, to salt the curd much; we might even do without salt altogether, for the large amount of fat (butter) in extra rich cheeses, such as Stilton or cream-Cheddar, sufficiently preserves the casein.

If salt is employed in excess, the cheese does not ripen properly, or acquire that fine flavour, which depends upon the fermentation proceeding in a sufficiently active degree. Too much salt, by checking this chemical activity, is thus injurious to the proper ripening of cheese. The saline taste of old cheese, as already explained, is not due so much to the common salt used in its preparation, as to certain ammoniacal salts which are formed during the ripening process. It sounds strange, but it is nevertheless the case, that over-salted cheeses do not taste nearly so saline when kept for six or eight months, as under-salted cheeses kept equally long. If the milk is very rich, somewhat less salt should be used than when it is poor. On no account, however, should more than 2 lbs. of salt be used per cwt. of cheese; 1½ lb. in most cases is quite enough, and even 1 lb. will be found a sufficient quantity when rich cheeses are made.

8. *Lastly, an inferior quality of cheese sometimes is produced when it is imperfectly salted;* that is, when the salt is not properly applied to the cheese. I have often seen the salt put upon the curd in rough bits; more often proper care is not taken to mix the curd with the salt, and the cheese becomes unequally salted. The consequence is that some particles of the cheese ferment too much, others too little, and that the portions which are too much salted do not stick well together, and acquire a dry and crumbly texture. The salt used in dairies should be of the finest description, and should be sifted evenly through a fine sieve on the curd, after the latter has been passed through the curd-mill, and thinly spread in shallow leads to cool. This plan of spreading the salt saves a great deal of labour, and is greatly to be preferred to the system of pickling the cheese in brine after it is made, or of rubbing in salt. When salt is applied, either in solution or by rubbing it into the cheese after it has been in the presses, the outside is apt to get hard, and close up too much. It is, of course, desirable to get a good and firm coat, but, at the same time, the pores should not be too much closed, so that the emanations which proceed from the cheese cannot escape. Thin cheeses may be salted after they have been in the press; but, in making thick cheeses, it is far better to salt the curd before it is put into the vat.

A rather novel way of salting cheese has lately been made the subject of experiments in America. As the following communication to the pages of the 'Country Gentleman and Cultivator,' an American agricultural paper, may have some interest, I take the liberty of inserting it here:—

"*Important Experiment in Cheese-making.*—The diary season is about commencing again, and I desire the privilege of a corner in your paper, to give the result of extended experiments in cheese-making. In the first place I shall take it for granted that the whole process up to salting is well understood, for it is of *salting* that I wish to speak in this article.

"In June, 1859, I finished a few cheeses after the following manner: When my curd was scalded (I practise thorough scalding), I threw into the vat about 4 quarts of salt—sometimes only 3—for a cheese of 50 to 60 lbs., stirring thoroughly. Those which went into the hoop before being well cooled off, acted badly; but when I took time and means to cool sufficiently, the cheeses were very fine. On the whole, I did not like the process, and abandoned it.

"In 1860 I commenced again, changing the programme as follows: After scalding I drew off the whey, leaving just enough to float the curd, and began to cool off, hurrying the process by pumping in cold water and changing often. Then, to a curd of say 60 lbs., a little more or less, I threw in sometimes 3 and sometimes 4 quarts of salt, and stirred till well cooled—then drew off the salted whey, and threw it on the compost heap—put the curd to press, and pressed rapidly and thoroughly. And now for the result. I lost from my whey tub about three pails of whey and some salt. I gained in this, that my dripping tub under the press never had a particle of cream rise upon it, and in having a cheese that gave me no trouble in curing, and that when sent to market sold for the very highest price, and called forth the unqualified approbation of dealers as being perfect in all respects—fine flavoured, very solid (not porous), and very fat.

"And now let me talk to the experience of dairymen. In the old-fashioned way of breaking up and salting a curd, more or less bruising of the curd to break the lumps, in order to get the salt evenly distributed, is necessary; and when put to press the white whey runs off freely, or in other words the cream runs off, and of course with it the richness of the cheese, and more or less of its weight; and if the curd is very dry you are liable to get your cheese too high salted, and if not, the reverse.

"My experiments clearly prove that a curd salted in whey will retain no more salt than it needs, and that as every particle comes in contact with the brine through the operation of stirring, no bruising is necessary. Whether this is the philosophy of it or not, I am not chemist enough to determine, but I do know that if there is no discharge of white whey, or cream, it is retained in the cheese, adding to it both richness and weight as a remuneration for the extra salt and the wasted whey."

III.—PRACTICAL ERRORS MADE IN KEEPING CHEESE.

The following are some of the practical mistakes that are occasionally made after the cheese has left the presses and is placed in the store-rooms.

1. *Cheese is deteriorated in quality when it is placed in damp or in badly-ventilated rooms.*

When beef or mutton is kept for a day or two in a damp and badly-ventilated place, the meat soon acquires a disagreeable cellar-like taste. The same is the case with cheese. Kept in a damp place, it also becomes mouldy, and generates abundance of mites.

In some parts of Cheshire it is a common practice to keep cheese in dark rooms, carefully shutting out the free access of air. This is an objectionable practice, which no doubt has its origin in the desire to maintain in the store-rooms a somewhat elevated temperature, and to avoid draughts of cold air.

It is quite true that draughts are injurious to newly-made cheese, and a somewhat elevated temperature decidedly favours its ripening and the development of a fine flavour; but the one may be avoided, and the other can be maintained quite well, at the same time that due provision is made for the admission and circulation of fresh air.

During the first stage of ripening, a good deal of water and other emanations escape from the cheeses, which, if not allowed freely to pass away, make the air damp and injure the flavour of the cheeses. Why cheese should be kept in dark rooms is to me a mystery.

2. *Cheese newly made is spoiled by not turning it frequently enough.*

Thick cheeses especially require to be frequently turned, in order that the water which is given off from the interior warmer parts of the cheese may freely escape, and all sides be exposed at short intervals to the air. If this is neglected, that part which is in close contact with the board on which it rests becomes smeary and rots, and by degrees the whole cheese is spoiled. The boards, we need hardly say, should be wiped with a dry cloth from time to time as well as the cheese.

3. *Cheese does not ripen properly, and therefore remains deficient in flavour, if the temperature of the cheese-room is too low.*

The ripening of cheese is essentially a process of fermentation, which may be accelerated or depressed by a proper or by too low a temperature. Any temperature under 60° is unfavourable, and should therefore be avoided.

4. *Cheese is also spoiled if the temperature of the cheese-room is too high.*

If the temperature of the room rises above 75° F. the fermentation becomes so active that a cheese is apt to bulge out at the sides, and to lose the uniform and close texture which characterises it when good.

5. *Lastly, cheese is sometimes spoiled if the temperature of the cheese-room varies too much at different times.*

A steady fermentation, which is essential to the proper ripening of the cheese, can only be maintained in a room which is not subject to great fluctuations in temperature. The more uniformly, therefore, the cheese-room is heated, the more readily cheese can be brought into the market, and the finer the quality will be. For this reason hot-water pipes, which give a very steady, gentle, and lasting heat, are greatly to be preferred to stoves in cheese-rooms; with the latter it is almost impossible to maintain an equable temperature. The cheeses nearest to the stove again are apt to get too much, and those farthest off not enough, heat. Constant attention is moreover required; and firing in the room is always productive of more or less dust and dirt. These inconveniences are entirely avoided by the system of heating by hot-water pipes.

In every dairy hot water is in constant request; the same boiler which heats the water for cleaning the dairy-utensils may be conveniently connected with iron-pipes that pass in and round the cheese-room. Beyond the first cost of the iron-pipes hardly any extra expense in fuel is thus incurred. An extra pipe likewise may be introduced which connects the boiler with Coquet's apparatus, and by this means the curd in the tub may be scalded much more conveniently and regularly than by pouring hot whey or water over it. I have not made a sufficient number of observations to say definitely which is the best temperature to be maintained in a cheese-room; but in my judgment a uniform temperature of 70° to 75° is highly favourable to the ripening process.

The proper regulation of the temperature of the cheese-room, and the general plan of heating by hot water, I believe, is one of greatest of our recent improvements.

These are some of the practical mistakes which I have noticed in our dairies. I have endeavoured to assign reasons why they must be so regarded, and have ventured to point out the appropriate remedies, many of which, however, suggest themselves naturally to any intelligent observer. My object has been, not so much to write a treatise on cheese-making, as to enable those interested in dairy operations to read the various treatises and pamphlets on cheese-making with profit, so as to be able to sift the recommendations which are worth imitating from the heap of empirical rubbish under which they are too often buried. No directions, however carefully given, can ever be of much service in an art which, like cheese-making, does not so much presuppose a great amount of knowledge as practical experience, dexterity, and cleanly habits. Neither skill in manipulation, nor habits of cleanliness, nor experience can be acquired by reading. A good or a sensible pamphlet, no doubt, may be read with benefit even by an experienced hand; but the very best of treatises, in the nature of things, cannot teach a person who wants a rule or a recipe for everything how to make good cheese. A good cookery-book, no doubt, is a useful literary production, but the best cookery-book is incapable of teaching an inexperienced person the art of making light and wholesome pie-crust.

It is the same with cheese-making as with cookery, as we shall do well to bear in mind.

Lest these observations on publications on cheese-making should seem to disparage too much the merits of the different authors, I may state distinctly that a few papers contain valuable and plain directions for making good cheese; but I am bound at the same time to confess that the greater number, and more especially most of the prize essays on cheese-making which I have read, in my humble opinion, are next to useless to the dairy-farmer, inasmuch as they generally contain nothing good but what every dairy-farmer has long known ever since he began making cheese,—and a great deal besides, which, though it may appear novel, ingenious, or feasible, will at once be condemned by any man of sound judgment as visionary and utterly impracticable.

There are many topics intimately connected with the manufacture of cheese on which I have not touched at all, such as the influence of the food on the quantity and quality of milk, an important subject as yet hardly investigated at all. Again the influence of the race on the production of milk deserves to be carefully studied, besides various other points on which practical men may wish to obtain trustworthy information. My passing them over in silence in the present paper will not I trust be taken as an indication of want of acquaintance with the real practical wants of the dairy-farmer.

Hitherto scarcely anything directly bearing on dairy-practice has been done by scientific men: the whole investigation has, therefore, engaged my liveliest attention, and brought to light some unexpected chemical facts which have been recorded in the preceding pages. Others I hope to lay before the readers of the Journal when the researches still in hand shall be in a sufficiently advanced state to warrant their publication.

Royal Agricultural College, Cirencester, June, 1861.

IV.—*Experiments upon Swedes.* By Dr. Augustus Voelcker.

Agricultural experiments are of little or no practical utility unless they are continued from year to year for a long period, and tried on a variety of soils in good and in bad seasons in a manner which allows us, if not to eliminate, yet clearly to recognise the disturbing influences of climate, season, condition of soils, and other circumstances which often affect the produce in a higher degree than the manures on which we experiment. A single field-experiment is as likely to lead us in a wrong as in a right direction. Few persons have the inclination or are in a position to persevere in such a laborious, expensive, and in many respects unthankful course of investigation. But little trustworthy experience and no knowledge is gained from the great majority of published experiments with artificial manures which meet our eye from time to time in the agricultural newspapers, from the want of this continuity of action. For this reason I have continued field-experiments upon swedes, similar to those published in this Journal in 1855 and 1858, and have now the pleasure of presenting to the Royal Agricultural Society a third report on field-experiments upon swedes. I regret to say that in 1858, and again in 1860, my experiments were failures; and only in 1859 did I succeed in getting an even plant and results on which reliance can be placed, and from which I trust some useful information may be gathered.

Although I completely failed in securing an even crop in 1858, it still appears to me advisable that I should describe briefly the kind of experiments which I then made, and give the weight of the produce; for sometimes useful lessons may be learned from failure as well as from success.

In previous trials, extending over five seasons, I found that, on the soils on our farm:—

1. Ammoniacal salts, such as sulphate of ammonia, used alone, had a decidedly injurious effect upon the turnip-crops, even when used in small quantities.
2. Ammoniacal manures applied to swedes at first checked the growth of the plant, and had ultimately no beneficial effect on the crop, either alone or in conjunction with phosphates.
3. Guano proved a less economical manure than superphosphate of lime.
4. The addition of salt to superphosphate seemed to benefit the crop.
5. In dry seasons the best artificial manures are often of little or no more service to the produce than inferior and all but worthless manures.

With a view of verifying these general conclusions, and obtaining at the same time information on some other points on which I shall have to speak presently, I made the following experiments.

Part of a 40-acre field, marked Nos. 6 and 10 in the map of the farm attached to the Royal Agricultural College, was divided into 20 plots, of 8 poles each:—

No.
1 was manured with farmyard-manure, at the rate of 20 tons per acre.
2 „ 20 tons of farmyard manure and 2 cwts. of superphosphate per acre.
3 „ 3 cwts. of superphosphate.
4 „ 1 cwt. of superphosphate.
5 „ 6 cwts. of superphosphate per acre.
6 „ 3 cwts. of gypsum.
7 „ 2 cwts. of superphosphate and 1 cwt. of guano per acre.
8 „ 3 cwts. of Peruvian guano per acre.
9 „ 1 cwt. of sulphate of ammonia per acre.
10 was left unmanured.
11 was manured with 3 cwts. of bone-dust per acre.
12 „ 2 cwts. of sulphate of ammonia per acre.
13 „ 3 cwts. of dissolved bones per acre.
14 „ 1 cwt. of nitrate of soda.
15 „ 2 cwts. of superphosphate, 1 cwt. of salt, 40 lbs. of nitrate of soda, and 40 lbs. of sulphate of ammonia per acre.
16 „ 3 cwts. of common salt per acre.
17 „ 3 cwts. of superphosphate per acre.
18 „ 3 cwts. of superphosphate and 1 cwt. of sulphate of ammonia per acre.
19 „ 3 cwts. of sulphate of potash per acre.
20 „ 3 cwts. of superphosphate and 1 cwt. of nitrate of soda per acre.

The artificial manures were all finely powdered, and before sowing mixed with red ashes (couch-ashes and burnt soil) at the rate of 10 cwts. per acre. The manures mixed with the ashes were sown on the 19th of May, and the seed (Liverpool or Skirving's swede) on the 21st of May. The plants came well up, but were eaten by the fly, and the field had to be resown on the 7th of June. Each experimental plot measured one-twentieth of an acre, and comprehended 4 rows of drills of equal length. The distance from drill to drill was 26 inches. The plants were singled out 12 inches apart. Unfortunately the experimental swedes, as well as the roots adjoining, after having passed the ordeal of the fly, were afterwards attacked by a black caterpillar, the 'black-jack,' as it is called here. Every exertion was made to prevent the ravages of this pest, but without effect. I then tried to make good the bare places by transplanting young swedes, and succeeded tolerably well; but as I had to repeat the transplanting of the roots several times when the season was far advanced, many of the transplanted roots came to nothing, and after all I obtained an unequal crop.

Passing over the composition of the different manures, and the analysis of the soil, I will now record at once the result of the weighings of each plot:—

TABLE *showing Produce in Swedes, topped and tailed and cleaned, of each Experimental Plot and per Acre.*

Plot.	Manure.	Per $\frac{1}{20}$ Acre			Per Acre.			
		cwts.	qrs.	lbs.	tons.	cwts.	qrs.	lbs.
1	20 tons of farmyard-manure per acre ..	10	1	21	10	8	3	0
2	20 tons of farmyard-manure and 2 cwts. of superphosphate	10	1	2	10	8	2	9
3	3 cwts. of superphosphate	11	1	12	11	7	0	16
4	1 cwt. of superphosphate	9	1	0	9	5	0	0
5	6 cwts. of superphosphate	11	0	13	11	2	1	8
6	3 cwts. of gypsum	10	3	16	10	17	3	12
7	2 cwts. of superphosphate and 1 cwt. of guano	12	0	8	12	1	1	20
8	3 cwts. of Peruvian guano	13	2	9	13	11	2	12
9	1 cwt. of sulphate of ammonia	13	2	10	13	11	3	4
10	No manure	11	1	13	11	7	1	8
11	3 cwts. of bone-dust	10	2	15	10	12	2	20
12	2 cwts. of sulphate of ammonia	10	1	22	10	8	3	20
13	3 cwts. of dissolved bones	11	0	0	11	0	0	0
14	1 cwt. of nitrate of soda	12	3	20	12	18	2	8
15	2 cwts. of superphosphate and 1 cwt. of salt	12	1	13	12	7	1	8
16	3 cwts. of common salt	11	3	24	11	19	1	4
17	3 cwts. of superphosphate	10	2	18	10	13	0	24
18	3 cwts. of superphosphate and 1 cwt. of sulphate of ammonia	10	3	17	10	18	0	4
19	3 cwts. of sulphate of potash	9	3	26	9	19	2	16
20	3 cwts. of superphosphate and 1 cwt. of nitrate of soda	10	0	0	10	0	0	0

I give this table in order to show how strangely sometimes experiments turn out, and how necessary it is to observe carefully all circumstances which may affect the final produce. If no notice had been taken of the cause which operated so injuriously on the experimental roots, the strangest deductions might have been arrived at. Thus, it might appear that 1 cwt. of sulphate of ammonia per acre was the best turnip-manure; that 1 cwt. of superphosphate per acre, on the other hand, was injurious to swedes, inasmuch as in the preceding experiments it diminished the produce; that 3 cwts. of gypsum per acre were as good as 3 cwts. of bone-dust for turnips, and that both are equal in fertilizing power to 20 tons of farmyard-manure. These and other absurd conclusions might all be derived from experiments in which the produce has been accurately weighed. Similar contradictions and anomalies strike the attention of the experienced and critical reader of the many reports of like experiments printed in our newspapers. In many instances we cannot but admit that these have been conducted in a conscientious and careful manner; yet the results are such, that if due allowance be not made for circumstances which may easily be overlooked, conclusions may readily be drawn from them which may mislead the inexperienced or confirm the particular fancy of the prejudiced. Thus, let a manure be ever so worthless, yet, if it be tried under varied conditions, it will for some reason or other prove in some few cases superior to fertilizers of recognized merits. If we suppose that these accidental successes are recorded, and all the preponderating number of failures or questionable successes ignored, we see at once how it comes to pass that artificial manures, like the British Economical manure and many others that possess little or no fertilizing value, are nevertheless strongly recommended, and that men of undoubted character are found to testify in good faith that such rubbish is superior to guano, bone-dust, and other well-known fertilizers. Testimonials of manures, even when given by the best and most experienced men, have little value; and, as they are much more apt to lead astray than to do good, it would be well if leading agriculturists would abstain altogether from giving them.

Nothing is more difficult than to establish by experiment a general truth in agriculture. We not only require to modify agricultural experiments in a great variety of ways, but, after we have continued them for a number of years and carefully recorded the results, it is necessary to exercise the greatest caution in interpreting the results, and to look almost with suspicion on everything which at first sight appears plausible or even conclusive.

The preceding experiments, beyond the lesson which they afford of diffidence in accepting points which are said to have been proved by practical experiment, teach us absolutely nothing.

FIELD EXPERIMENTS ON SWEDES MADE IN 1859.

The field selected for the experimental trials in 1859 was in tolerably good condition. It bore clover in 1857, and wheat in 1858. The soil is moderately deep, and well-drained. A portion of the soil, taken from a large sample from different parts of the field, was submitted to analysis, and the following results obtained:—

Composition of Soil from Experimental Field No. 7 of the Royal Agricultural College Farm, Cirencester.

Moisture (when analysed)	3·960
Organic matter and water of combination	9·616
Oxides of iron and alumina	19·660
Carbonate of lime	3·805
Sulphate of lime	·345
Phosphoric acid	·075
Magnesia	·783
Potash	1·239
Soda	·090
Insoluble siliceous matter (chiefly clay)	60·525
	100·098

560

The soil contains hardly any sand that can be separated by the mechanical process of washing and decantation. It contains, like most of the soils on our farm, an appreciable quantity of sulphate of lime, and also of phosphoric acid. It is not so rich in carbonate of lime as many other of our fields, and is rich enough in clay to be called a good agricultural clay.

This field was quite level, and in a good state of mechanical subdivision.

An acre of this land was divided into 20 parts. The different artificial manures, after having been mixed with couch-ashes and burnt soil, were sown on the 6th of June; the land was ridged up and the seed (Skirving's swedes) drilled on the 7th of June. Each experimental plot contained 4 rows of equal length. The distance between the drills was 22 inches; the plants were singled out 12 inches apart. One part of the field was manured in autumn; the greater part in spring; the portion selected for experiments being then left unmanured.

The following list exhibits the arrangement of the experimental field, the kinds of manure employed, and their quantities, calculated per acre:—

Experiments upon Skirving's Swedes in Field No. 7, Royal Agricultural College Farm, Cirencester, 1859.

Plot		Per Acre
1	was manured with	15 tons of rotten dung.
2	„	15 tons of rotten dung and 2 cwts. of superphosphate.
3	„	3 cwts. of superphosphate.
4	„	1 cwt. of superphosphate.
5		6 cwts. of superphosphate.
6		3 cwts. of gypsum.
7		2 cwts. of superphosphate and 1 cwt. of guano.
8		3 cwts. of guano.
9		1 cwt. of sulphate of ammonia.
10	was left unmanured.	
11	was manured with	3 cwts. of fine bone-dust.
12		2 cwts. of sulphate of ammonia.
13		3 cwts. of turnip-manure.
14		1 cwt. of nitrate of soda.
15		6 cwts. of turnip-manure.
16		3 cwts. of salt.
17		3 cwts. of bone-ash treated with sulphuric acid.
18		3 cwts. of dissolved bone-ash and 1 cwt. of sulphate of ammonia.
19		3 cwts. of sulphate of potash.
20		3 cwts. of dissolved bone-ash and 1 cwt. of nitrate of soda.

The rest of the field received about 15 tons of farmyard-manure and 3 cwts. of superphosphate mixed with ashes at the time when the seed was drilled. The seed was of the same kind as that used in the experiments. Four rows of turnips, occupying exactly one-twentieth of an acre, were reserved on two sides of the experimental plots, and the produce from these two additional plots was weighed when the produce of the 20 experimental plots was ascertained.

On each plot of the experimental field a remarkably even and good plant was obtained. The season being mild, the roots continued to grow throughout November; they were, therefore, left in the field until the 8th of December, when the crop was taken up. The roots were topped and tailed and cleaned, and the whole produce of each plot then carefully weighed, with the following results:—

TABLE *showing Produce per Acre of Swedes, topped and tailed and cleaned, and Increase per Acre over the Unmanured portion, in Field* 7, *Royal Agricultural College Farm, Cirencester*, 1859.

Plot.	Manure.	Produce per Acre.				Increase per Acre.			
		tons.	cwts.	qrs.	lbs.	tons.	cwts.	qrs.	lbs.
1	15 tons of farmyard-manure	18	10	2	24	3	16	1	20
2	15 tons of farmyard-manure and 2 cwts. of superphosphate	17	6	3	4	2	12	2	0
3	3 cwts. of superphosphate	17	11	2	10	2	17	1	6
4	1 cwt. of superphosphate	17	6	3	4	2	12	2	0
5	6 cwts. of superphosphate	21	2	3	12	6	8	2	8
6	3 cwts. of gypsum	16	14	1	4	2	0	0	0
7	2 cwts. of superphosphate and 1 cwt. of Peruvian guano	18	11	1	20	3	17	0	16
8	3 cwts. of Peruvian guano	18	17	2	20	4	3	1	16
9	1 cwt. of sulphate of ammonia	15	17	3	12	1	3	2	8
10	No manure	14	14	1	4		..	..	
11	3 cwts. of fine bone-dust	18	9	2	16	3	15	1	12
12	2 cwts. of sulphate of ammonia	16	17	3	12	2	3	2	8
13	3 cwts. of turnip-manure	20	1	1	20	5	7	0	16
14	1 cwt. of nitrate of soda	18	9	1	4	3	15	0	0
15	6 cwts. of turnip-manure	20	7	0	16	5	12	3	12
16	3 cwts. of common salt	15	16	1	0	1	1	3	24
17	3 cwts. of dissolved bone-ash	20	15	2	24	6	1	1	20
18	3 cwts. of dissolved bone-ash and 1 cwt. of sulphate of ammonia	20	6	3	24	5	12	2	20
19	3 cwts. of sulphate of potash	17	0	2	4	2	6	1	0
20	3 cwts. of dissolved bone-ash and 1 cwt. of nitrate of soda	21	0	2	4	6	6	1	0

The two plots adjoining the experimental field yielded:—

1	Manured with farmyard and superphosphate	17	6	1	20	2	12	0	16
2	Manured with farmyard and superphosphate	17	18	0	24	3	3	3	20

In looking over the list of the different manures employed in these experiments, it will be noticed in the first place that certain simple salts which commonly enter into the composition of artificial manures have been used separately. It is not likely that we shall ever understand the action of complicated manures if we do not carefully study the separate effect of their component parts on vegetation. For this reason one plot was manured with sulphate of ammonia, another with sulphate of lime (gypsum), a third with sulphate of potash, a fourth with chloride of sodium, and, finally, one with nitrate of soda.

In the next place we have in Plot 17 phosphates chiefly in a soluble condition, and free from organic matter or anything else but sulphate of lime, which is necessarily produced when bone-ash is treated with sulphuric acid. In another plot (No. 18) we have the same materials in conjunction with sulphate of ammonia; and in No. 20 we have them united with nitrate of soda.

Then with respect to the form in which the nitrogen is applied in these experiments, I would observe that we find it in farmyard-manure, partly as ready-formed ammonia, partly in the shape of semi-decomposed nitrogenized organic matter. In sulphate of ammonia it exists, of course, as a salt of ammonia. In nitrate of soda we apply nitrogen in the shape of nitric acid. In guano nitrogen exists, partly only in the form of ammoniacal salts, the greater portion of nitrogen being present as uric acid and other organic compounds which readily yield ammonia on decomposition. And, lastly, we have in the turnip-manure all these different forms in which nitrogen can be applied to the land combined together with phosphates.

The results of these experiments, though unsatisfactory in some respects, are nevertheless interesting and suggestive in others, and worthy of some comments:—

Plot 1. *Manured with* 15 *tons of Farmyard-manure per Acre.*

	tons.	cwts.	qrs.	lbs.
Produce	18	10	2	24
Increase	3	16	1	20

Plot 2. *Manured with* 15 *tons of Farmyard-manure and* 2 *cwts. of Superphosphate per Acre.*

	tons.	cwts.	qrs.	lbs.
Produce	17	6	3	4
Increase	2	12	2	0

In comparing the weight of roots from these two plots, it would appear that the additional quantity of superphosphate has had rather an injurious than a beneficial effect. This, however, would be against common experience. It is probable that there were more plants on No. 1 than on No. 2. Let us suppose that there were 100 plants more on Plot No. 1, and that each root on an average weighed 2 lbs.; on calculating the increase per acre we should obtain nearly 1 ton more on the first plot than on the second. I regret not having counted the number of roots.

If the land is in a poor, unmanured condition, the difference in the weight of roots taken from 2 acres of land—one acre containing 2000 or 3000 plants less than the other—may be hardly appreciable, provided the roots have not been drilled too far apart and not singled out too wide apart; for on the acre on which a less number of roots is grown, each root has more room, and, as the land is in a poor condition, the plants are less stinted in food than on the second acre. We obtain thus larger but fewer roots on one acre, and smaller but more roots on the other; and the difference in the produce of both acres may be imperceptible, and even in favour of the acre on which the smaller number of roots were grown. But supposing the land is in a high state of fertility, and each plant can find abundance of ready-prepared food, the result must be quite different. If singled out too wide apart, the roots will be found not much larger than on similar land planted moderately close; and in the latter case the weight per acre will be larger than on the former.

Here, as in so many other instances, it is impossible to lay down exact rules how far apart the drills should be, and how wide the plants should be singled out. On some land 26 inches by 15 inches is not too wide; on other land 22 inches is a good width between the drills, and 12 inches a fair distance between the plants. If the soil is shallow and poor, the drills should be at least 26 inches apart, and the plant singled out rather wide; for the roots in that case will extend their feeding-fibres on the surface, and require a larger space than they do in a deep, well-pulverised, loamy soil.* On the whole, I am inclined to think that in many cases we do not get so heavy a crop of roots when we plant too far apart, as when we plant closer. Farmers do not like to see their neighbours grow bigger roots than they themselves can grow; but I question much whether the objectionable custom of giving silver prize-cups to large-sized roots has not done a great deal towards diminishing the quality as well as the quantity of the produce in bulbs per acre. I am inclined to think an acre of roots of moderate size, and grown tolerably near together, is worth more money than an acre of large-sized roots planted far apart. Some time ago I had a calculation made of the number of roots which can be grown per acre when drilled at different distances and singled at different breadths, and as these calculations may be useful to others, and convince them, as they have done myself, that we should manure the root-crop well in the first instance, and then plant tolerably closely, I have incorporated them in the following table:—

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* The proposed time and mode of consuming the crop will have nearly as much to do with determining these distances as the soil. Late white turnips, intended to serve as spring food for ewes and lambs, may well be sown with 5 drills, occupying the same space as 3 rows of Swedes intended to be partly drawn and stored. Plants not fully developed, and young, resist atmospheric influences far better than those that are ripe and large. It is by no means clear to me that on the poorer soil the smaller root is not more eligible, apart from the question of total weight per acre.

The difference between the power of full grown white mustard, and that which is but a few inches high, in resisting frost is remarkable. For many of man's uses the ideal and fully developed plant is not the most serviceable.—P. H. F.

TABLE, *showing the Number of Roots per Acre, drilled at different intervals and singled at different distances, also the Area occupied by each Plant, in square inches.*

Singled apart, in Inches		Width of Drills.	Number of Plants per Acre.	Area occupied by each Plant. Sq. inches		Sq feet.
9	by	26	26,806	234	=	1 5/8
9	„	22	31,680	198	=	1 3/8
12	„	26	20,104	312	=	2 1/6
12	„	22	23,760	264	=	1 5/6
15	„	26	16,083	390	=	2 5/7
15	„	22	19,008	330	=	2 7/24
18	„	26	13,403	468	=	3 1/4
18	„	22	15,840	396	=	2 3/4

But to return to the plots. I have reason for believing that there must have been more roots on Plot No. 1 than on Plot No. 2; for I find the land on one side of the experimental plots yielded 17 tons 6 cwts. 1 qr. 20 lbs. per acre, and on the other side it gave 17 tons 18 cwts. 24 lbs. per acre. The whole field, as mentioned already, was manured with about 15 tons of yard-manure and 3 cwts. of superphosphate. This produce agrees well with the weight of the roots on the second plot, manured with dung and superphosphate. Still we have a difference of nearly 12 cwts. of roots in the two plots adjoining the experimental lots, and ought, therefore, to remember that the natural variations of the land and other purely accidental circumstances may readily give a difference in the produce of different portions of land which have been treated in every respect alike. Indeed, if the difference in the produce does not amount to more than 1 ton, or even 1½ ton, I fear we cannot do much with the results. It certainly would be rash to lay stress on such differences, and to use them as arguments in proving or denying the efficacy of certain manuring matters:—

Plot 3. *Manured with* 3 *cwts. of Superphosphate.*

	tons.	cwts.	qrs.	lbs.
Produce	17	11	2	10
Increase	2	17	1	6

Plot 4. *Manured with* 1 *cwt. of Superphosphate.*

	tons.	cwts.	qrs.	lbs.
Produce	17	6	3	4
Increase	2	12	2	0

Plot 5. *Manured with* 6 *cwts. of Superphosphate.*

	tons.	cwts.	qrs.	lbs.
Produce	21	2	3	12
Increase	6	8	2	8

The superphosphate used in these experiments had the following composition:—

Moisture	10·80
*Organic matter	4·21
Bi-phosphate of lime	20·28
Equal to bone-earth rendered soluble	(31·63)
Insoluble phosphates	4·11
Hydrated sulphate of lime (gypsum)	46·63
Alkaline salts (common salt)	10·78
Insoluble siliceous matter	3·19
	100·00

* Containing nitrogen	·34
Equal to ammonia	·41

It will be observed that in this experiment 1 cwt. of this superphosphate gave nearly as much increase as 3 cwts. of the same manure. It would, however, be rash to generalise from this one instance; nothing less than a dozen experiments in different parts of the field would have warranted the conclusion that on this soil 1 cwt. of superphosphate will give as good a crop of roots as 3 cwts.; for the fact that the soil is not particularly rich in phosphoric acid renders such a supposition unlikely. Moreover, we have a direct evidence in the Experiment No. 5 that the roots were grateful for an abundant supply of phosphates. 6 cwts. of the same superphosphate here yielded the heaviest increase of all the 20 experimental plots. The superphosphate ued in this experiment was chiefly made from bone-ash, and contained but very little nitrogen. We have thus here another proof that a good crop of roots can be obtained on clay land with superphosphate alone, containing but little nitrogenized or other organic matters.

Plot 6. *Manured with* 3 *cwts. of Gypsum.*

	tons	cwts.	qrs.	lbs.
Produce	16	14	1	4
Increase	2	0	0	0

The gypsum employed in this experiment was ordinarily good, finely-powdered gypsum, which did not effervesce with an acid, thus proving that it did not contain any carbonate of lime.

It seems that in this instance gypsum has had unusual effect on the produce. Probably the ashes with which the gypsum was mixed had a share in the increase.

Plot 7. Manured with 2 cwts. of Superphosphate and 1 cwt. of Peruvian Guano.

	tons.	cwts.	qrs.	lbs.
Produce	18	11	1	20
Increase	3	17	0	16

The increase produced by a mixture of 2 cwts. of superphosphate and 1 cwt. of Peruvian guano, it will be seen, is greater than the increase produced by 3 cwts. of the same superphosphate.

In many instances I find that a mixture of two parts of good superphosphate and one part of Peruvian guano gives a better crop than either superphosphate or guano applied alone.

Plot 8. Manured with 3 cwts. of Peruvian Guano.

	tons.	cwts.	qrs	lbs.
Produce	18	17	2	20
Increase	4	3	1	16

In this case Peruvian guano produced rather a better result than the mixture of superphosphate and guano used in the preceding experiment. However, the difference does not amount to more than 6 cwts., which is too insignificant to decide the question whether in the case before us Peruvian guano alone had really a better effect upon the crop than the mixture of superphosphate and guano. In former years I have found, however, that Peruvian guano produced not nearly so great an increase as superphosphate alone, or a mixture of superphosphate and guano. There are, no doubt, soils for which guano is the most profitable manure even for root-crops; but this is rather the exception than the rule.

If there is a deficiency of available nitrogenized matters in a soil, a moderate amount of ammoniacal matters appears decidedly to benefit the turnip-crop.

On the soil of the experimental field nitrogenized matters appear to have had a beneficial effect even when applied by themselves, which was not the case in the experiments which I tried on other soils in past years.

The composition of the Peruvian guano used in this and the preceding experiment shows that it was a genuine sample of superior quality, as 100 parts on analysis yielded—

Moisture	16·12
*Organic matter and ammoniacal salts	52·31
Phosphates of lime and magnesia	22·55
Alkaline salts	7·94
Insoluble siliceous matter	1·08
	100·00
Containing Nitrogen	**14·64**
Equal to ammonia	**17·77**

Plot 9. *Manured with* 1 *cwt. of Sulphate of Ammonia.*

	tons.	cwts.	qrs.	lbs.
Produce	15	17	3	12
Increase	1	3	2	8

Plot 12. *Manured with* 2 *cwts. of Sulphate of Ammonia.*

	tons.	cwts.	qrs.	lbs.
Produce	16	17	3	12
Increase	2	3	2	8

The sulphate of ammonia used in these experiments was found to consist, in 100 parts, of—

Pure sulphate of ammonia	98·28
Fixed salts	·78
Moisture	·94
	100·00

The increase on Plot 9, obtained with 1 cwt. of sulphate of ammonia, is inconsiderable, and might be ascribed to natural variations in the soil, or to the ashes with which the sulphate was mixed. But the larger increase, produced by double the quantity used on Plot 12, together with the fact that Peruvian guano produced a much better result than in former experiments, shows that sulphate of ammonia has had a beneficial effect on the swedes in this instance. The effect, however, was not great when compared with that produced by phosphatic manures.

Plot 11. *Manured with* 3 *cwts. of fine Bone-dust.*

	tons	cwts.	qrs.	lbs
Produce	18	9	2	16
Increase	3	15	1	12

Bone-dust, as might have been anticipated, gave a considerable increase. The bone-dust used in this experiment was very fine, it having been specially reduced to a coarse meal. On analysis it was found to consist of—

Moisture	10·58
*Organic matter	30·61
Phosphates	51·67
Carbonate of lime and magnesia	6·03
Alkaline salts	0·58
Sand	0·53
	100·00
Containing nitrogen	3·71
Equal to ammonia	4·50

Plot 13. *Manured with* 3 *cwts. of Turnip-manure.*

	tons.	cwts.	qrs.	lbs.
Produce	20	1	1	20
Increase	5	7	0	16

Plot 15. *Manured with* 6 *cwts. of Turnip-manure.*

	tons	cwts.	qrs	lbs
Produce	20	7	0	16
Increase	5	12	3	12

The turnip-manure used in these experiments on analysis gave the following results:—

Moisture	15·16
*Sulphate of ammonia	8·64
†Soluble nitrogenized organic matters ..	9·25
†Insoluble nitrogenized organic matters ..	11·13
Bi-phosphate of lime	4·99
Equal to bone-earth rendered soluble ..	(7·79)
Insoluble phosphates (bone-earth)	16·48
Hydrated sulphate of lime	19·26
Alkaline salts	12·55
Insoluble siliceous matter	2·54
	100·00

* Containing nitrogen	1·83
† Containing nitrogen	3·91

This is a very superior manure, which it will be seen produced a very large increase on Plot 13, though only 3 cwts. were applied to the acre. It is somewhat remarkable that double the quantity of this manure did not produce a much more considerable increase.

Plot 14. *Manured with* 1 *cwt. of Nitrate of Soda.*

	tons	cwts	qrs	lbs.
Produce	18	9	1	4
Increase	3	15	0	0

I am not aware of any accurate experiments in which nitrate of soda has been used by itself for turnips. The effect which so small a quantity as 1 cwt. of nitrate of soda produced on the crop was decidedly beneficial, for it will be noticed that as large a produce was obtained with 1 cwt. of nitrate of soda as with 3 cwts. of fine bone-dust. This result is certainly encouraging, and suggests a series of trials with nitrate of soda upon root-crops. The nitrate should be used in such trials by itself, as well as in conjunction with superphosphate or bones. The nitrate of soda used in this experiment was a good sample. It contained in 100 parts—

Moisture	1·87
Pure nitrate of soda	95·68
Chloride of sodium	·79
Sulphate of soda	1·17
Sand	·49
	100·00

Plot 16. *Manured with* 3 *cwts. of Common Salt.*

	tons.	cwts.	qrs.	lbs.
Produce	15	16	1	0
Increase	1	1	3	24

Common salt, it seems, has had little or no effect in this experiment; but it does not follow that it may not be beneficially applied to swedes in conjunction with other fertilizing substances. On analysis the salt yielded the following results:—

Moisture	7·66
Organic matter	·09
Sulphate of lime	3·44
Chloride of magnesium	·11
Chloride of sodium	88·70
	100·00

Plot 17. *Manured with* 3 *cwts. of Dissolved Bone-ash.*

	tons.	cwts.	qrs.	lbs.
Produce	20	15	2	24
Increase	6	1	1	20

In preparing the manure used in this experiment, 100 lbs. of good commercial bone-ash were mixed with 70 lbs. of sulphuric acid; and after some time this mixture was dried up with 50 lbs. of sulphate of lime. By these means an excellent superphosphate was obtained, as will be seen by the following analysis. The manure, being made of bone-ash, did not contain any ammoniacal salts nor appreciable quantities of nitrogen:—

Composition of Dissolved Bone-ash.

Moisture	5·65
Organic matter	3·51
Bi-phosphate of lime	19·64
Equal to bone-earth rendered soluble ..	(30·65)
Insoluble phosphates	·86
Hydrated sulphate of lime	64·96
Alkaline salts	1·83
Sand	3·55
	100·00

The result of this plot affords another proof that a good crop of swedes may be obtained with a superphosphate in which all the phosphates are rendered soluble, and which contains no nitrogenized matters. Some persons think that a good superphosphate should invariably contain insoluble as well as soluble phosphates, for they imagine that the latter are washed away too rapidly, and that therefore the superphosphate should contain insoluble phosphates, to sustain, as they say, the after-growth of the plant. It is a mistake to think that soluble phosphate is very readily washed away into the subsoil, and that it therefore merely pushes on the young plant, and is no longer available when the roots begin to swell. The fact is, no soluble phosphate—*i. e.* bi-phosphate—of lime, as such, can enter into the delicate structure of the root-fibres; it must first become insoluble before it can benefit the young turnip-plant, and this it does readily when it is washed by a shower of rain into the soil, or applied at once in a state of solution with the liquid-manure drill. At any rate we have here presented to us an instance in which a superphosphate containing no nitrogen, and, practically speaking, no insoluble phosphates, produced an increase of 6 tons of cleaned swedes, topped and tailed, or almost as large an increase as any of the fertilizers tried in these experiments.

Plot 18. *Manured with* 3 *cwts. of Dissolved Bone-ash and* 1 *cwt. of Sulphate of Ammonia.*

	tons	cwts.	qrs.	lbs.
Produce	20	6	3	24
Increase	5	12	2	20

In this experiment the addition of sulphate of ammonia to dissolved bone-ash appears to have done no good whatever. I do not think, however, that the small difference in weight between Plots 17 and 18 warrants the conclusion that its influence was prejudicial.

Plot 19. *Manured with* 3 *cwts. of Sulphate of Potash.*

	tons	cwts.	qrs	lbs.
Produce	17	0	2	4
Increase	2	6	1	0

The sulphate of potash used in this experiment was a good commercial sulphate. It produced about the same increase as 2 cwts. of sulphate of ammonia; and, in comparison to the effect which phosphatic manures produced, must be considered as a manuring constituent which did not seem to be required on the soils on which the experiments were tried.

Plot 20. *Manured with* 3 *cwts. of Dissolved Bone-ash and* 1 *cwt. of Nitrate of Soda.*

	tons.	cwts.	qrs.	lbs.
Produce	21	0	2	4
Increase	6	6	0	1

In comparison with the produce from No. 17, we have here in round numbers 14 cwts. more roots. This larger increase falls quite within the limits of variation which we must naturally expect in two different parts of the same field. It cannot be, therefore, regarded as a proof that nitrate of soda increased the efficacy of the dissolved bone-ash.

Rejecting some anomalous results, as those obtained from

Plots 1 and 2, I think we may safely draw the following con sions from the preceding experiments:—

1. They indicate in the most decided manner the great superiority of phosphatic matters as manuring constituents for root-crops.

2. It would indeed appear that a sufficient quantity of soluble phosphates renders other fertilizing matters superfluous on soils that have a constitution similar to that of the experimental field.

3. Although ammoniacal salts have had some slight effect when applied alone, they did not appear to exercise any specific action on the turnip-crop.

4. The experiments leave it undecided whether it is desirable to add ammoniacal salts or nitrates to superphosphate. At the same time they appear to favour the view that on clay soils nitrogenized matters do not increase the efficacy of soluble phosphate in a turnip-manure, and to confirm my previous observations extending over a number of years.

5. In this series of experiments nitrate of soda had a decidedly beneficial effect on the turnips.

In 1860 precisely the same fertilizing matters were used on another field of our farm, and the experiments made in every respect in the same manner as in 1859. An unfavourable season, the turnip-fly, and other casualties, unfortunately spoiled my experiments. I am glad, therefore, that in place of experiments made by myself, I am in a position to communicate a series of experiments which I induced the late Mr. Campbell, of Craigie House, Ayr, to institute in 1860. Mr. J. Russell, steward to the late Mr. Campbell, kindly favoured me with the following tabular statement, showing the quantity and kind of manure employed per acre, its cost, and the produce in clean roots, topped and tailed. (See p. 86.)

The experimental piece of ground, I am informed, appears to be of equal quality. The soil is considered a rich, light, sandy loam. Each plot was composed of 3 drills, and occupied 2 poles imperial measure. Distance from drill to drill 28 inches. The seed, Skirving's Improved Purple-top Swede, was sown on the 18th of May, and the roots taken up on the 22nd of November. The roots grown on the central drill of each plot were carefully freed from dirt, topped and tailed, and weighed. The roots on Plots 1, 2, 3, 11, I am informed, were soon left behind. On Plots 1 and 11, as will be seen, no manure was applied; and on Plots 2 and 3 sulphate of ammonia only. The produce on one of the two unmanured portions of the land amounted to 1 ton more than on the other.

Experiments upon Swedes made at Craigie House, Ayr.

Plot.	Manures applied per Imperial Acre.	Cost of Manure per Acre.			Produce per Imperial Acre.			
		£.	s.	d.	tons.	cwt.	qrs.	lbs.
1	No manure		..		17	0	0	0
2	1½ cwt. of sulphate of ammonia	1	4	0	18	17	0	16
3	3 cwts. of sulphate of ammonia	2	8	0	20	17	2	0
4	2 cwts. of sulphate of ammonia and 3 cwts. of superphosphate, made from bone-ash and sulphuric acid (dissolved bone-ash)	3	2	0	26	3	1	12
5	5 cwts. of dissolved bone-ash, the same as that used in No. 4	1	15	0	26	15	1	12
6	5 cwts of dissolved bone-dust	1	17	6	24	17	0	14
7	7 cwts. of dissolved bone-ash, the same as in No. 4	2	9	0	24	19	1	4
8	3 cwts. of dissolved bone-ash, the same sample used in No. 4	1	1	0	24	0	0	0
9	10 cwts. of dissolved bone-ash	3	10	0	24	10	2	24
10	6 cwts. of phospho-Peruvian guano	3	12	0	30	6	1	2
11	No manure		..		16	0	0	0
12	6 cwts. of Peruvian guano..	3	18	0	31	10	0	20
13	11 cwts. of dissolved bone-dust..	4	2	6	30	8	2	8
14	30 tons of Dublin street-manure, including cartage	3	0	0	24	8	2	8
15	5 cwts. of Ritchie's dissolved bones	1	17	6	26	6	1	20
16	10 cwts. of Ritchie's dissolved bones ..	3	15	0	27	8	2	8

A careful reader will not fail to notice some strange discrepancies in the preceding experimental results. Thus it will strike him as peculiar that 3 cwts. of dissolved bone-ash yielded 24 tons of roots, whilst 7 cwts. of the same manure gave only about 1 ton more, and 10 cwts. only 10½ cwts. more per acre. 5 cwts. of dissolved bone-ash, on the other hand, gave 26 tons 15 cwts. 1 qr. 12 lbs. 5 cwts. thus appear to have produced a heavier crop than 10 cwts. of the same manure.

I do not pretend to explain these discrepancies, but have no doubt the experiments were carefully made, and can only say that, for some reason or the other which often escapes our notice, some strangely anomalous results are sometimes obtained in field-experiments. The chief practical lessons which may be derived from these experiments appear to me to be—

1. That sulphate of ammonia had little effect upon turnips, even when applied to a light, sandy loam.

2. That the addition of sulphate of ammonia to superphosphate seemed to have had no decidedly beneficial effect on the crop.

3. That 5 cwts. of good superphosphate appear to be a sufficient dressing for roots on rich, light land, and consequently that it is a waste of money to apply such dressings as 8 or 10 cwts.

4. That cheap manures, costing, it may be, only 1*s*. per ton, in reality are generally more expensive turnip-manures than fertilizers which, like Peruvian guano, cost 13*l.* a ton, or superphosphate, costing from 6*l.* to 8*l.* a ton.

Royal Agricultural College, Cirencester,
June 16*th*, 1861.

V.—*On the Improvements in the Farming of Yorkshire since the date of the last Reports in the Journal.* By WILLIAM WRIGHT.

TWELVE years have elapsed since the Royal Agricultural Society held its annual county meeting at York, and that occasion was deemed a fitting opportunity for examining into the state of agriculture in the Three Ridings. The time having arrived when the Society again remembers us, the same inquiry again naturally suggests itself, and the Earl of Powis has nobly come forward to elicit investigation on the subject by the offer of a special prize. The question presented to us is, whether Yorkshire has improved since the last meeting. Has it kept pace with the other counties of England in the race of agricultural advancement? Is its land better and more extensively drained? Are the farm-houses and tenements better built? Are the crops heavier and superior in quality? On these and many other topics an answer is called for. It is not without a just appreciation of the range and importance of the subject that we enter upon the task of replying to these inquiries, and, whilst endeavouring to show what has been done, claim the privilege of pointing out what yet remains to be accomplished.

The Yorkshireman is, for the most part, proud of his county: its great extent, its pre-eminence for manufactures of wool, cotton, and silk (the two latter being shared with Lancashire); its extensive coal, iron, and lead mines, which are worked with great vigour and success; and, lastly, the high state of farming attained in many of its districts, all combine to give it a prominent place among the counties of England. Its growing commerce, whilst attesting the enterprising spirit of its inhabitants, greatly assists the interests of the farmer, and the perfection attained by the machine-makers of Leeds and other towns has likewise lent its influence to agriculture. Moreover, the zeal with which Leeds, Hull, York, Wakefield, Doncaster, and Harrogate contested the honour of receiving the Royal Society, is a sufficient evidence of the estimation in which the science and practice of agriculture is held in our great commercial towns.

We must first recall attention to the reports in the ninth volume of the Society's Journal, which were written at the time of the York meeting, viz., an Essay on the East Riding, by Mr. Legard; one on the West Riding, by Mr. Charnock; and one on the North Riding, by Mr. Milburn. These articles enter minutely into their subject; they give a full and clear geological description of the county, review the works of previous authors, remark on the physical peculiarities of the land, and conclude with an able description of the improved farming of that time. These Essays will be found an important aid in estimating the advance made at the present day. They were published in 1848, and we must glance at some important events and alterations which exercised great influence upon the husbandry of that day—an influence which has continued to the present time. The tariff had been changed, and foreign cattle admitted to free competition with our own stock. The corn-trade was undergoing an ordeal which was to try the firmness of friends and foes—one which, it must be confessed, was productive of great temporary depression and loss, and a trial so severe that, if we can now look back with complacency to those events, we have no hesitation in saying much is due to the spirit of enterprise and perseverance with which the tenant-farmer met them. A call was made for improved drainage; such men as Smith of Deanstone, Parkes of Westminster, ably supported by the pen of Gisborne, gave new life to the drooping spirit; a cheap but effective system of deep drainage was adopted, which is now almost universally introduced on soils requiring it. The modifications in the duties on wood, bricks, and other articles used in building, induced the improving landlord to erect suitable dwellings for the tenants, combining convenience with comfort, and better and more healthy accommodation for their cattle. Those who have visited countries where the most important adjuncts of agriculture (such as good roads, facilities for making manure, and keeping stock) are still in their infancy, are especially struck by the advantages we possess in these respects throughout the greater part of England, and especially in the county of York. When accompanying intelligent foreigners over different farms in this country, we found that they invariably expressed their surprise at the well-made roads, neatly-cut hedges, and careful culture which give our country the appearance of a large, well-kept garden; and the idea prominent on their minds has been—how wealthy English farmers must be, with such conveniences and such facilities! We heard their remark with just pride, but also with the feeling that there is another side to the picture. The farmer has difficulties to surmount; and if we realise in our day the gradual but lasting improvements of past years, we shall still find ample call for the further development of our resources, and happy it is that the means of doing this are to be found within ourselves, at our very doors.

With a view of simplifying our subject, we purpose to arrange our observations into two divisions—viz., first, Landlords' Improvements; and, secondly, Tenants' Improvements. For though the result is identical, namely, *improvement*, the *means* are and must be essentially different, and therefore can be more clearly defined by such a division.

I. LANDLORDS' IMPROVEMENTS.

That the improvements made by the landlords of Yorkshire have kept pace with the requirements of the present day would be a bold assertion. But those who have performed their duty in the widest sense of the word are far too numerous to particularise, and, were a just tribute paid to their worth, we should exceed the limits prescribed. Suffice it to say, Yorkshire is proud of her landlords, and their tenants respond to their efforts.

We know many farms where an outlay of 4*l.* to 5*l.* per acre has been made on new buildings erected on plans combining comfort, convenience, and healthiness; a similar amount on drainage, and a considerable sum in making roads, enlarging the fields, filling up ditches, and planting new hedgerows—amounting to a total of 12*l.* an acre thus added to the wealth of the country, and enabling the tenant to produce a yearly increased supply for the wants of the community. In carrying out these improvements, it is usually required of the tenant that he should pay an annual interest or increase of rent equivalent to five per cent. on the sum expended—an understanding mutually beneficial.

The landlords' attention has also been directed to the manufacture of tile and pipe machines; to their efforts do we chiefly owe the valuable and superior machines now in use. In order to obtain a good supply, many landlords have been compelled, by their distance from the tile-yards or the inferior quality of the goods there sold, to establish works for themselves, and thus a better article is substituted for the partially-burnt and ill-made tile of former days.

Within the limits of the period to which this notice extends, we date the perfecting of implements for digging the arterial and parallel drains, and the reduction of the expense of draining to the minimum consistent with good workmanship.

In some parts of the county considerable care has been bestowed in erecting buildings with regard to effect; we hail this commencement with pleasure, and doubt not but that shortly architecture, in the proper sense, will fully assert her claims, and picturesque beauty be combined with utility.

The good feeling which exists between the improving landlord and his intelligent tenant, springing mainly from a just estimate of their mutual interests, has prompted the former to co-operate with his tenant in the purchase of guano and in the introduction of improved stock, implements, seeds, fencing, &c.; thus enabling him to have a supply of the best materials to aid his efforts. On some farms held by the landlords in their own hands much service is thus rendered to the surrounding tenantry, of which we might cite instances that strongly tempt us to depart from our determination to speak of improving landlords only as a class, rather than do but partial justice by selecting individual cases.

Much attention has been bestowed of late on the improvement of cottages, an object which the prizes for the best plans lately awarded by the Yorkshire Society will do much to promote.

In the demand for timber and wood, which the landlord reserves to himself, there have been important variations. The great increase in the consumption of iron for shipbuilding, by diminishing the use of wood, has caused a considerable fall in the price of English oak within the last fifteen or twenty years. The reduction in the duties on foreign timber and deals has diminished the demand for some kinds of English wood. On the other hand, our expanding energies have opened out new sources of demand from our mines, our factories, our buildings, our agricultural implements, &c., and prevented that general decline in prices which was anticipated on the removal of the timber duties. Many landlords make more money per acre by growing wood than by letting land in farms. Fewer ash and more elm are now planted, but a rise to the value of fifty per cent. has taken place in osiers for basket-makers, and a great demand exists in the West Riding for coal-pit wood, for props, baskets, &c.

Mr. Pusey, in his admirable paper on the progress of agricultural knowledge during the eight years from 1842 to 1850, sums up the improvements demanded at the hands of the landlords under the twelve following heads, all of them applicable to Yorkshire (*Journal*, vol. xi. p. 381):—

1.—Draining: (1) Trunk draining; (2) Under draining.
2.—The removal of useless fences: (1) Fences; (2) Trees.
3.—Diminution of four-footed game.
4.—Burnt clay: (1) Border burning; (2) Clod burning.
5.—Marling or claying: (1) Sands; (2) Peat.
6.—Lime: liming grass-land.
7.—Boning pastures.
8.—Chalking.
9.—Irrigation, or catch-meadows: (1) Hill side; (2) Flat; (3) Flood.

10.—Breaking up grass-land.
11.—Improvement of farm buildings.
12.—Warping.

The list is at first sight sufficient to appal any man whose pocket is not inexhaustible; but examination proves them all to be valuable if not indispensable to the development of agriculture. Have the Yorkshire landlords responded to these requisitions? We fear to press the inquiry. If we except numbers 4, 9, and perhaps 10 of these twelve heads, an estate is not perfect unless the other requisitions are complied with. On the hills, liming, chalking, and marling; on the lowlands, draining, removing fences and trees, diminishing game, claying sand and peat, warping where practicable, liming and boning grass-land, are required. Mr. Pusey justly and considerately says, "these are the improvements which it is in the landlords' power to effect:" in other words, we place the standard before you; we invite you to examine it and follow it on your own estates for the full development of the resources of the land.

Yorkshire, having a moister climate than many of the southern counties, derived the greatest benefit from covered yards for cattle, which are equally applicable to high and low districts, combine shelter with warmth, preserve those elements in the manure which are apt to be lost when exposed, and are invaluable for the economical feeding of cattle and horses. We did not venture to urge this on the attention of landlords and tenants before we had fully tried the effect, and, having satisfied ourselves of the advantage of the shed system, we recommend it with confidence: it is as superior to box-feeding as that was to the old-fashioned cattle-house. The manure is always excellent in quality, ready for use at any time; nothing is lost, no liquid-manure tanks are wanted. Our shed has repaid its cost, once if not twice, and on no consideration would we return to the old system of open yards. When new buildings are wanted, the covered yard is not more costly than the old-fashioned open range of buildings, and excellent materials in iron or timber can be procured at a moderate outlay.

No more acceptable or convincing proof of the improvement in agriculture can be given than the fact of the increased value of land—an increase not fluctuating with the price of grain, but permanent and steady. When an estate is in the market, which occurs but seldom, the land makes, at a moderate computation, fully ten per cent. more than it would have brought twelve years ago. The improvements effected by the landlords naturally command a higher rental. This state of things must be satisfactory, and has fulfilled the anticipation expressed by an able writer, in a time of the greatest depression: "That the hereditary owners of land would, by the continued exertion of that energy and prudence which carried those from whom they inherit their possessions through all changes, continue to maintain their social position."—*Gisborne's Essay on Agriculture*, p. 255.

The list of non-improving landlords is happily but small in this county; but as long as any remain these observations would be incomplete were they not briefly brought under notice. On the estates of such owners are found the ancient hedgerows existing in wild luxuriance; ponds, often occupying large spaces, sometimes in small enclosures of not more than six or seven acres; headlands unploughed; roads and drainage neglected, or, if attempted, done very inefficiently; farm-buildings small and ill-contrived, and the farmhouse, if one story high, with a sledge or pitch-roof, small and incommodious; the tenantry low-rented, but poor and spiritless, exhausting still more the already impoverished soil, neither benefiting themselves nor the community at large. Such a picture is neither imaginary nor overdrawn: we could mention several large estates to which it accurately applies.

We cannot read the early reports on agriculture without finding everywhere complaints of the difficulties thrown in the way of improvement. Strickland says justly of fiscal fetters that they are the bane of agricultural improvement; high prices were not sufficient to encourage farmers, for the taxes were proportionately increased, and with little prospect of relief: we may therefore date the greatest progress from the recent period when these burdens were in part removed. Charnock justly observes, in his Essay on the West Riding (*Journal*, vol. ix, p. 304):—"It was not until all this had passed (the late war) that men looked to find what improvements were needed at their own doors; and true as this was of all classes in general, it was, I believe, more especially so with respect to the cultivation of the soil. The high price of produce at that time was practically no incentive to agricultural improvement, nor was it until year after year prices gradually readjusted themselves to peace rates, that the agricultural interest as a body became sensible that continued profits from the land were to be obtained by the additional produce of an improved and more economical cultivation, at a lower scale of prices."

The aim of the landlord should be to maintain his estate in an "improving condition;" that is to say, the deposit of fertilising elements in the soil should always be in excess of the aggregate of those abstracted in the marketable produce. The warning voice of Liebig urgently called our attention to the maintenance of this progressive fertility. No county offers so many advantages as Yorkshire for a sufficient and permanent supply of solid manure, and nowhere can the efficacy and economy of sewage manure be more favourably tested than near such towns as Leeds, Sheffield, Bradford, Halifax, Huddersfield, York, and Hull. We trust that the present generation will find means to stay the vast waste of our sewage, as effectual as those already applied to the supply of gas and water.

This is not a proper place for a lengthened discussion on this subject. Its great importance, however, must be our apology for pursuing it a little further before we proceed to a consideration of our second division; for this is not a tenant's but a landlord's question. A tenant cannot be expected to take up a scheme of such magnitude, though he might and would essentially aid its working. With regard to the expense, let us instance the cost of supplying with fertilisers a well-cultivated farm of 200 acres of ordinary land. To keep up a regular supply of manure, such a farm requires ten tons of linseed cake, or in lieu thereof an equivalent in corn; also in artificial manures, either ammoniacal or phosphoric, a further annual outlay of 80*l.*, which will make a yearly cost of 200*l.*, or 1*l.* per acre. Such an estimate is not a high one for manure only, lime, &c., not being included. We purpose to replace this outlay by offering 20*s.* per acre for a jet of "sewage supply," and we think the experiment would be a boon to the farmer, and present to the contractor an ample profit on the outlay for interest and working expenses. Charnock gives some pertinent remarks on this subject. He mentions (*Journal*, vol. ix., p. 309) a case of land growing wheat in succession many years, and producing thirty-nine and forty-two imperial bushels per acre. He says, "Now this land adjoins the river Calder, the floods from which have proved a sufficient manuring to maintain its full fertility and yet grow successive crops of wheat year after year, and this field is by no means a solitary instance of the richness of this and many others of the West Riding valleys that are watered by its rivers."

We have during the last ten years collected reliable data of the money value of sewage, and we will give our experience in the hope of stimulating the interested parties, landlords in particular, to commence operations in this county, which offers such peculiar facilities. We commenced experiments at Sigglesthorne by building underground two cisterns, each capable of holding from 3000 to 4000 gallons: they were made watertight. Into one of these the contents of two water-closets are collected; into another a third water-closet and all the "slops" of the house. The family averages fourteen persons, and for the last ten years the whole sewage of the house has been carefully preserved and applied—first to a flower-garden of three acres, a moderate-sized vinery, shrubbery, and kitchen-garden, and the remainder put on a grass-field of about seven acres, which from an almost barren waste has become so fertile that we have ceased to irrigate it and are now dressing another field. No solid dung, such as stable or foldyard manure, has been applied to the vinery for the last ten years, yet the vines have produced an abundance of fruit and in the greatest perfection; and with regard to fruit the strawberries are more than usually prolific. Two common lift-pumps are fixed to the cisterns; the liquid is pumped by hand and wheeled away in a barrel suspended in a convenient barrow. When applied to the grass-land, one of Crosskill's liquid manure-distributors is used. We estimate its yearly value on our farm and garden to thirty tons of good dung, worth 12*l.* The facility with which liquids are now dealt with is shown in the 'Report on the Drainage of Whittlesea Mere,' by Wells (*Journal*, vol. xxi., pp. 134). Such a scheme, which involves the lifting of 6000 gallons of water six feet a minute, could only have been carried out by the use of steam-power; and many a town presents facilities for draining off its sewage and conveying it to the surrounding land which would render the task as easy as that of reclaiming the Mere. But where shall we find such spirited men as accomplished that task? England has been foremost in other improvements of late years: let her lead the van in this great modern experiment.

Mr. Joseph Mitchell, F.R.S.E., Member of the Institute of Civil Engineers, speaking of the results of experiments in distributing sewage at Rugby, says, "That any town (unless London, from its immense size, be an exception), not particularly unfortunate in its situation, may profitably utilize its sewage, even though steam-power and iron pipes have to be made use of to a certain extent; for I think that, on a rough estimate, the sewage of the town applied at the rate of one acre to every forty inhabitants would on an average add about 4*l.* per annum to the value of that acre, which comes to 1*l.* for every ten inhabitants—gross, not net value—subject to numerous exceptions and conditions."

A series of events are taking place which press the subject more than ever upon our notice. In consequence of the limited supplies, Peruvian guano has been raised to a price which greatly restricts its consumption. America and the Continent, the West Indies and the Mauritius, are as good, if not better, customers than we are. The shipments of bone-ash from South America are falling off, and will every year diminish, for the use of bones is increasing considerably abroad. Linseed cakes are very dear, being at the time we write 12*l.* per ton. There has been no response to the offer made by the Society of 1000*l.* to the discoverer of another Ichaboe. Our population is increasing; beef and mutton maintain their high price; greater produce is invited; and yet we supinely look on, whilst our largest supply of manure is passing off unemployed and lost.

Amongst the measures for improvements still to be accomplished, few, if any, are of more importance than the revision of our regulations for the maintenance of the roads and highways. As the law now stands, an overseer of roads may expend the parish money, subject only to the accounts being audited by the justices at the petty sessions; but who inquires whether the overseer is a competent person? or if the roads are judiciously repaired, or the parish money properly applied? We think a remedy for this might be found by appointing competent surveyors; but, as this subject may occupy the attention of the Legislature, we forbear to do more than indicate its importance. The appointment of such surveyors with powers to enforce the draining of the highways, which are now throughout the greater part of the lowlands altogether undrained, would soon effect a great saving of expense to the parishes, giving them more substantial roads, and at less cost for materials. In like manner the wear and tear of sleepers on the railroads running through the lowlands would be much lessened by cutting on each side, not mere shallow channels for surface-water, but deep and effective drains, not less than 6 feet below the rails.

In some parts of the country the preservation of game, and especially of four-footed game, is continued to a prejudicial extent, but considerate landlords have in a great many instances had the numbers reduced, and we trust to see their good example still further followed.

While deep drainage is, without doubt, the foundation of every improvement in agriculture, yet, with all our experience, it is often most imperfectly done; so many opinions prevail, each one putting forth his peculiar nostrum for universal application, whereas each district requires its own peculiar drainage: on one point, however, all are agreed,—the importance of procuring a good outfall. Take the district of Howdenshire, for example, which includes a circuit of fifty miles. This large district should be made to fall into the Ouse and Humber, the finest outfalls in England: but no great public effort is made to carry the water thence by efficient trunk-drainage; whilst at present there is no proper drainage for this extensive district, excepting by two imperfect channels made for navigation purposes, one of which is carefully preserved. The Derwent, which runs through the northern parts, is so tortuous, and its outlet so bad, that the immense body of water which it gathers in its course floods a vast area for miles in extent and for weeks together. This district is now waterlogged; and it is improbable, let the weather be never so dry, that the damage done in 1860 can be recovered in 1861; and yet this county might be made perfectly dry. The undertaking is a great national work and a pressing necessity, which no private enterprise can grapple with. This difficulty, however, is not confined to Howdenshire, but, for many miles beyond, the country requires relief by efficient trunk-drainage with improved cloughs or flood-gates.

Some works have been commenced in the Rye and Derwent, but with inadequate means, and they remain consequently unfinished. The past season has caused the most sceptical to believe in the necessity for vigorous measures to carry off the surplus water more directly to the sea, and afford a better outfall to some of the richest land now laid under water. Trunk-drainage has been carried out in Holderness in a most spirited manner. The example, however, has not been followed in districts equally requiring it.

Following upon drainage is the enlargement of fields and stubbing up of old and useless hedgerows. In a farm of 450 acres in this district of Howdenshire a direct saving of about 17 acres, and an equal benefit from the saving a like extent of headlands when under root cultivation, was the result of reducing 51 fields into 17; by these means the rays of the sun and the current of air were enabled to act with greater effect,—so as to increase the evaporation, raise the temperature of the soil, check blight and mildew, forward the ripening of the grain before harvest, and diminish the risk of sprouted sheaves, and accelerate the work of carting after it has been cut. The gain derived from ploughing without short turnings is worthy of special notice. A short examination into the number of hours spent in ploughing say 1 acre, the distance traversed with a 9-inch furrow, and the rate at which horses when in motion can step without difficulty, will show how very large a portion of the day is spent in these convenient occasions for loitering.

The saving which will be effected by no longer keeping in repair those useless encumbrances the hedgerows, which are from 3 to 4 feet high for arable, and from 6 to 7 feet for cattle-grazing lands, will probably suffice for the supply of those hurdles which may be required under the new arrangement.

The effect of good drainage is to encourage clean farming, which, though well understood, was seldom carried out prior to the period under our notice. It has paved the way for the excellent practice of working cultivators on the stubbles in the autumn—the greatest improvement in the husbandry of modern times.

The tenure of land throughout the county is almost universally upon lease from year to year; the long lease is quite the exception, and there is no desire for change. Mutual confidence appears to prevail to an extent which is creditable to both parties, and the question of tenant-right is seldom a cause of dispute in this county. When a farm is out of condition, much exhausted, and of doubtful tenure, a tenant-right is reasonable; and for such a farm the following "Tenant-right Agreement" has been made:—For linseed-cake, lime, bones, or any artificial manures used on the farm, the tenant is entitled to receive from the landlord or in-coming tenant the following proportions of the cost of these manures: 1st, for linseed-cake one-third the amount of the sum expended during the last year of tenancy;[*] 2nd, for lime four-fifths of the sum expended during the last year of tenancy, three-fifths of the sum for the second year, two-fifths for the third year, and one-fifth for the fourth year previous to quitting; 3rd, for bones and artificial manures two-thirds of the amount expended during the last year, and one-third for the second year previous to quitting. We, however, know of a case within our own experience where a tenant was offered this "right," and he replied he was content to remain as he was. In the report by Mr. Pusey before alluded to he judiciously suggests the modification of the stringent covenants which are sometimes required of tenants. The principle of adapting our management to the requirements of the times, and of allowing a margin to an improving tenant, is a beneficial one. Changes constantly occurring from the influence of climate and seasons, fluctuating markets, and the varying wants of the consumer, render it inexpedient to enforce with rigour the fulfilment even of revised covenants. Hence the licence enjoyed on many of the best-farmed and most improved estates; and we have pleasure in recording that this liberality is the rule of Yorkshire landlords. In the part of the county between Doncaster, Wakefield, and Pontefract, the tenant-right is slowly undergoing some modifications, and landlords are said to be buying up, as farms fall in, those claims, established by time and custom, which constitute an excessive demand on the capital of the incoming tenant.

Considerable additions have been made to the Crown lands at Sunk Island, at the mouth of the Humber, by embanking, enclosing, and converting the land into farms. The improvements have been made by the Commissioners for the Woods and Forests, and have been carried on by them in a most spirited manner both as regards farm-buildings and drainage. About the year 1850 nearly 700 acres of excellent land were added to the estate by means of embanking. The new land is most valuable, and requires little manure for many years; showing, by the natural and luxuriant growth of white clover, the richness of the soil, and its capacity for producing the largest crops. In addition to Sunk Island, about 400 acres of new accretions have been added to Patrington, and a considerable portion to Ottringham, Welwick, and other places in the immediate neighbourhood. Upwards of 10,000 acres have been so reclaimed and converted into valuable farms between the years 1668 and 1850, when the last embankment was completed.

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[*] This appears to me to be a very high rate of allowance; one-fourth is, in my judgment, quite as much as our present knowledge warrants us to covenant under *all circumstances of consumption*. At a higher rate than this I should be reluctant to take to a farm; at a lower, I should feed scantily before quitting.—P. H. F.

Next to embanking, the warping of the large district extending from the Trent and Ouse to Goole, Crowle, Thorne, and Selby requires notice, to show that improvements often described as combining some of the happiest efforts of human skill still go on. Schemes which for want of experience entailed great losses upon the original promoters, have ultimately, under better management, proved a profitable speculation as well as a public benefit. Some of these extensive warping works are now being brought to a conclusion; but another clough of larger dimensions has been put down about eight miles above Goole, in the Dutch River, by which a large area is likely to be improved between Thorne and Rawcliffe Common, besides several other cloughs in the Dutch River and in the rivers Aire and Ouse, annually rewarping and enriching the neighbourhood.

A great improvement in these private works has been made since 1848, prior to which the system of warping was more or less crude. The difficulty lay in equalising the deposit; the irregularity of which, both in depth and quality, restricted the value of the land when the surface had been sufficiently raised. In the land lying nearest the drain, sand predominated, in consequence of the greater size and weight of its particles; further on, sand and mud were so mixed as to make a very firm soil; and the furthest portion formed a low-lying, tenacious clay. Under the present system, by changing the lines and forcing the water at the outset to the lowest and furthest portion of the flat intended to be warped, the soil is equalised in quality; for wherever a low and strong deposit has been formed, the mischief is in a great measure rectified by directing the water over it with a rapid current.

The land takes from two to three years to rewarp according to the weather; if wet, the strong freshes in the river are adverse to the deposit; if dry, the deposit is great, but after a long drought it sometimes becomes of too solid a nature, and in that case acts prejudicially upon the crops when the land is under cultivation. A singular instance may be given as an illustration of this fact. The lands, the warping of which was concluded in the dry season of 1826, never cropped beneficially for 15 years afterwards; the best security against this is to finish warping after the winter season is over.

These works are carried out on different terms; by hire at from 12*l.* to 24*l.* per acre according to the height of the land, the distance of embankment required, and the probable time it may require to keep the land under the process. When the cloughs are the property of the landlord, in some instances the improvement is solely carried on by him, the land being relet at an improved rent when finished; in others, the rent nominally remains the same, the proprietor undertaking to raise the embankments, for the cost of which the tenant pays 5 per cent. During the process of warping, however, the landlord remits one-half of the rent of the land; the tenant sacrificing the other half, and levelling the embankment when it is completed: but this is a very expensive mode for the tenant, and is only carried out when the most perfect confidence exists between the landlord and tenant: and no part of the county furnishes stronger proofs of the necessity of this confidence than the district where extensive works and improvements like these are carried out. After the warping is finished, drainage follows, which is accomplished on the principle previously explained. The vastness of the system of warping will ever remain as a striking characteristic of the energy of the country.

This county may be said to be about two-thirds drained with 2-inch pipes and parallel drains of a depth of 4 feet; but in some places, such as the vale of the Derwent and the lands on the banks of the river Hull between Beverley and Driffield, the maindrains or outfalls not being sufficiently lowered, the drainage is necessarily less complete. Indeed, from the insufficiency of the outlet, the back-water often causes great destruction to the standing crops, particularly in a wet summer like that of 1860. The want of an efficient outfall renders 4 feet draining impossible in these districts, and an injurious effect is produced on the climate. Were all the impediments withdrawn, and the natural drainage of the county allowed to flow, the agricultural produce would be augmented, the stock of sheep and cattle improved and increased, and the healthiness of the lowlands considerably promoted.

As further proof of the inefficiency of the present drainage of this part of the county, we extract a paragraph from a local paper published last November:—" The recent heavy rains have caused the Derwent and its tributaries to overflow their banks, and on Friday and Saturday the vast tract of country watered by that river and the smaller streams was laid under water. In many places the water rose to a height of four feet and even more, the hedges having for miles quite disappeared. The consequence of the inundation will prove most destructive to the lowland farmer; the unusually rainy season had done much injury in retarding the sowing of the wheat crop, which will now be rendered quite impossible; many thousands of acres will thus be thrown under spring crops. The aftermath in the grass-lands will be spoilt by the deposit of sand and mud, and the cattle will be totally dependent upon the scanty root-crops. Several stooks are floating down the stream; one farmer alone being said to have lost upwards of 20 acres of oats. In the marshes several beasts are reported as having been found drowned." Means are being taken to remedy the evil under which this district labours: on the 1st of December in last year, at an influential meeting of landowners held at Howden, the following resolution was unanimously passed:—"That the renewal of the Commission of Sewers for the limits of Howdenshire and the west parts of the East Riding (the last Commission having expired on the 12th of July, 1843) would be of considerable benefit and advantage to the owners of land situate within such limits and their tenants."

We must not close our remarks on the landlords' improvements without noticing the liberality shown and the encouragement given to the Agricultural Societies during the last 12 years. These societies have deservedly enjoyed the patronage of the public. Their meetings are the proper places for the enterprising farmer to gather, as it were, into one focus the choicest specimens of his farm; there he can with just pride refer to the improvements he has made by his skill and ingenuity, and point out to his fellow countrymen and countrywomen what honest and laudable industry can accomplish. There he meets his landlord under circumstances flattering to both; and the landowner does wisely in supporting such institutions. But here we must pause. When leaving the show-yard they meet in the dining-hall to exchange their congratulations, are we reminded of the palmy days when these societies were young? Are they true to the cause for which they have met? It is true there is no protection to support, nor free trade to denounce, but is there not found a dearth of information on those scientific or practical questions on which the tenant expects to get some suggestions, if not instruction, from his landlord? The days of these exhibitions are numbered if they are allowed to pass off in stale allusions to electioneering topics. We wish to see them made the channels for communicating the experience of improving landlords and tenants—the fitting occasion for recording what has been done by others for the encouragement of younger, but not less aspiring, followers in the path of agricultural improvement.

Of late years the practice of giving a prize for the best-managed farm within a given district has been less common. When they were offered the great number of competitors testified to the estimation in which such prizes were held. The result was certainly beneficial in exciting a spirit of emulation and inquiry. We hope to see it revived; a few pounds expended in this way is money well laid out, but the credit and renown gained by the successful candidate is more valued by him than money or plate.

II. TENANTS' IMPROVEMENTS.

We now arrive at the second part of our subject, viz. "Tenants Improvements"—a field so varied and extensive that, for the sake of clearness, we purpose to treat separately of the high-land and low-land farming. Before, however, entering into details, we must pay the same tribute to the merits of the generality of our tenant farmers as we have previously paid to improving landlords. Amongst this class are found men of enlarged views, of sound and practical information, who carry on their improvements with a spirit and energy not surpassed in any profession. That there will be exceptions is evident. Bad farming is still to be met with, and often in close neighbourhood with the best. On such farms the carelessness or ignorance of the manager is visible to every eye. Hedgerows are left unrepaired, ditches stopped up, ploughing is carried on in the old way three inches deep, the land yielding half crops, few or no roots are grown, and the stock consequently are few in number and poor in kind. If such men are supplanted and their farms given to others, have they any one to blame but themselves? To such men no mercy can or ought to be shown. Landlords do a public service in removing such tenants.* The worst managed farms are generally the lowest rented: the tenant's reasoning being that, if he improves, the rent will be raised,—a reasoning at once fallacious and unjust, such as, even if true, could not possibly be a justification for negligence and idleness. Such farmers work their land with the smallest possible outlay, and if, by the strictest economy, they save capital, it is invested in other securities, as if the farm they occupied owed nothing to the landlord but the rent; nor does it even enter into their consideration that from their slovenliness and neglect, want of skill and good management, they inflict a loss upon the community at large. It is pleasant to turn to a brighter picture, and record what has been accomplished by a different class of men in—

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* Besides the general duty of promoting the public wealth, there is another, which, being more personal, is more likely to come home to the feelings of a kind-hearted landlord when hesitating to take the inevitably harsh step of dismissing a tenant—I mean the duty of consideration for the labourer. When the tenant only makes ends meet by extreme parsimony, the workman is sure to be pinched; when he is driven to makeshifts, these fall most severely on that dependent who can, in some sort, shift for himself. Uncertain employment, days' work cut short by rain, small chance of superior earnings by piece-work, undue advantage taken of the position of unmarried lads—some of the positive evils attendant on beggarly farming—are hardly more demoralising than the negative side of the picture; for the absence of good training in the work of the farm, of a good plain education, and consequently of openings for other forms of service, together lead to a state of stagnation, which almost obliterates the distinction between the condition of the labourer and the serf.—P. H. F.

1*st*. *High-land Farming*.—This includes a large district, called the Wolds, extending in a north-easterly direction from Hessle to Flamborough Head, and embracing some of the best farming to be found in this county—or perhaps in any other. Caird says of this district: "It presents a very uniform and gradually inclined plane, joining the low-land on the south-east, and rising to its greatest elevation on the north about 800 feet above sea-level, whence it gradually falls southward to an altitude of about 500 feet. The country is well enclosed generally by thorn hedges, and plantations everywhere grouped over its surface add beauty to the outline, while they shelter the fields from the cutting blasts of winter and spring. Green pasture fields are occasionally intermixed with corn, or more frequently surround the spacious and comfortable homestead; large and numerous corn-ricks give an air of warmth and plenty; whilst the turnip-fields, crowded with sheep, make a cheerful and animated picture. . . . The neatly trimmed hedges and well-built ricks show that the labourer is expert, and that the farmer likes to have his work well done."

There is no decline to record in the superior style of farming so long pursued by the spirited farmers in this district; and if we are unable to mention many improvements, it is because, comparatively, there was but little room left for them. A few, however, have come under our notice, of which perhaps the greatest has been effected by the free expenditure of the tenant's capital in the purchase of artificial manures. The able work of Liebig, now used as a text-book, has greatly increased the use of these manures, by imparting the knowledge required for their proper application; indeed the recent researches of scientific men have clearly proved the inaccuracy of many principles which had previously been received as correct, and discovered many defective points in the management of manure, besides bringing to light those valuable artificial manures, with their use, to which the Wold district is especially indebted for its present high cultivation. Under their guidance the use of bones, formerly bestowed with lavish extravagance, has been regulated, and hand tillages supplied in such quantities as to combine efficiency with due economy; many of them containing those elements which, when applied on the soil, retain the moisture or the gases of the atmosphere, thereby assisting the growth of the plant, as well as enriching the soil. Many tenants in this district expend annually in artificial manure and oilcake a sum equal to their rent.

The improvements required of the landlord in this district have been limited to improved house accommodation, and to the erection of those new farm-buildings which the requirements of the times made almost compulsory; there is yet much to be done in these respects, which it is hoped will, ere long, be fully carried out.

A marked improvement has taken place with regard to the waste of straw which prevailed so late as the year 1848. As the farmer increased the number of his cattle he became more alive to the value of his straw to supply his fold-yard with better manure, and also to be used as food when mixed with more costly nutriment. The quantity of linseed-cake used throughout this district is at least doubled within the last few years.

The scythe is giving way to the reaping-machine, as in 1847 the former had almost superseded the ancient sickle. The locomotive steam threshing-machine supplants the old horse threshing-machine; and lastly, the steam-plough and cultivator will, ere long, cause the modern horse-plough to be discarded, which, in its day, was a great improvement over the heavy implements used by our ancestors.

Extensive marling and liming of the Wold district has also been accomplished within the period assigned to this Report. The lime is obtained from calcareous rocks, the substrata of this district, at a cost of 4*s.* 6*d.* a chaldron; half the price it would reach if it had to be brought from a distance. The Wold farmers have of late been more than ever alive to the importance of this outlay, the effects of which commonly last for twenty years; though if by deep ploughing the subsoil is stirred and brought into action, the land will not require a repetition of this dressing when that time has expired.

Admirably adapted as the four-course system is to the Wold district, on some farms it is found too exhausting, and here a variation is found beneficial. To sustain the powers of the soil a five, six, or even seven course is then resorted to, by the introduction of beans, peas, or an extra year of grass-seeds; still the disease, called "fingers and toes" in turnips, and the failure in the clover crop, too frequently put the ingenuity and skill of the intelligent farmer to a severe test. Experience teaches that marling and liming the land is the best and most certain remedy for the turnip disease, but many farmers in consequence have been induced to try mangold-wurtzel, and with the best results; the change is found so beneficial that, in all probability, they will be grown alternately with turnips, and by thus giving the land a longer rest better crops of each will be secured.

To ensure a full crop of clover care should be taken to procure good and genuine seed from the low districts of Holland, but we shall have occasion to refer more fully to this subject in treating separately of clover-seed.

There are difficulties in writing a Report on the Farming of Yorkshire which do not apply to any other county. Its large extent, occasioning differences of soil, climate, and productions between the East, West, and North Ridings, the variety of local customs and habits, the influence of manufactures felt by the West Riding farmer in a higher rate of wages, and in heavier poor-rates in times of commercial depression:—these and other peculiarities make it almost impossible to give a clear and succinct view without constantly falling back on the past, or diverging beyond the limits proper to this Report. To return to the Wold district: notwithstanding the improvements in machinery for economising horse and manual labour, the position of the agricultural labourer is raised; since 1848 the wages of a day-labourer, without board, have risen from 12*s.* to 14*s.* and 15*s.* per week; harvest work, per acre, from 7*s.* to 10*s.*, and clover-mowing from 2*s.* 6*d.* to 3*s.* 6*d.* with beer.

The greatest imperfection is to be found in the farm-buildings and homesteads; on few estates only have the old incommodious buildings been replaced by new and more convenient houses. The Yorkshire Society, however, has this year offered considerable premiums for the best plan of farmsteads for farms of from 200 to 500 acres, by which, we trust, an impulse will be given to the erection of first-class buildings; whether covered or open yards have the preference, we shall hail the result with satisfaction, though from our own experience, based on some years' trial, we assign the preference to the covered home-stall.

The high-lands of the West Riding next claim a passing notice. These, when improved, are chiefly devoted to pasture; they are limed and manured from the populous districts of the valleys, and have reached a surprising fertility, which, considering the climate, would put to the blush many farmers who have far better land in situations more favourable to the growth of grasses and cereals. Some excellent farming is found about Sheffield, and we have noticed great improvements around Harrogate, but the high-land in the West Riding available for agriculture is limited in extent, and improvement is by no means the rule. We must however remark, that year by year more land is reclaimed from the moor and placed under the plough, thus diminishing considerably the number of unprofitable acres.

in the Riding. Operations are commenced by draining, for, without that, ploughing would be in vain; roads are then made over these hitherto wild tracts, fields enclosed, farmhouses built, and, where a few years ago the sportsman wandered in quest of wild game, crops of corn are now found, with the usual accompaniments of cultivation.

On the limestone hills, in the neighbourhood of Settle, there has been no change in the leases, which differ in no material respect from those of sixty years ago, and contain the same restrictions with regard to ploughing. Draining, except in a few instances, is not improved; the old mode of carrying the drains across the hills being still adhered to. We must not, however, omit to mention the great attention which is here given to the improvement of the grass-land; it has been carefully attended to, and appreciated, even from time immemorial.

The consumption of animal food, bread, and other necessaries of life, is very large, and still increasing in this Riding; Wakefield, Leeds, Rotherham, Doncaster, and Pontefract furnish the chief weekly markets, where the corn, cattle, and sheep from the other Ridings find ready purchasers, the railways affording great facilities for the conveyance of these articles from the most distant farms.

Of the high-lands in the North Riding it may be said that more improvement has taken place here, since the report given by Milburn, than in any other part. Nearly all the draining there required has now been done effectually, either by the landlord and tenant jointly—the one finding the materials, and the other the labour; or by Government loans, the tenant carting all the materials and paying 7 per cent. on the money expended. These improvements have been made at a cost which cannot be estimated with accuracy, but three-fourths of the outlay has been expended by the tenant. We must, however, mention that tenants have not always had the benefit of a landlord's assistance in carrying out their improvements. When draining has been done with Government money, they have carted all the materials, stubbed up old fences, planted new ones, filled up ditches, and made new roads at a considerable cost. In some districts more improvement has taken place during the last few years than during the previous half-century, by manuring more heavily, by cropping more frequently, by economising horse and manual labour, and by means of improved implements; yet the ungenial belt of millstone grit and limestone shale is still a barrier to profitable or extensive cultivation, although the beds of ironstone lately discovered give a value to these hills which was little anticipated.

Much improvement is made in the system of feeding cattle in all the high-land districts. Box-feeding is extensively practised, and there is a growing wish to have covered sheds where the cattle can run and feed together, thus making richer manure, and doing better than when in solitary pens. The breeding of cattle or horses is not much attended to on the Wolds; the former are generally bought in and sold out, either fat or in store condition, and such horses only are bred as are absolutely required on the farm; it is in the North and West Ridings that we find most attention given to the breeding of cattle, sheep being the favourites of the Wold farmer.

The adulteration of tillages, linseed-cake, and clover-seed is perhaps the worst evil against which the farmer has to contend, inasmuch as it is subtle and unseen. We have on a former occasion (*Journal*, vol. xix. p. 515) endeavoured to guard the consumer of linseed-cake against the use of an adulterated article on the plea of cheapness. We believe those and the like endeavours have been of some service, but a renewed warning may help to prevent this evil from "growing by what it feeds upon." It is our belief, confirmed by long experience, that a great deal of the "clover sickness," of which so much is heard on all descriptions of soil, is attributable, in a considerable degree, to the adulteration of the seed.

Some years ago we constantly found patches of land where the clover failed, and, having no reason to suppose this arose from any inability of the land to grow clover, we began to look out for the cause. The seed was bought annually from an old-established seed-house, and we never suspected the true cause of failure until one year, when a field of 14 acres sown, as we supposed, with clover-seed, was so filled with weeds, and especially docks, that there was little or no clover at all. We now resolved to change our seed-merchant, and applied to another house, explaining the disappointment we had experienced, and desiring them to purchase from their friends in Holland clover-seed, regardless of price, but with the distinct understanding that we were to be supplied with true and genuine seed. We have never been disappointed in our crops since, and "clover-sickness" is now unknown on our farm.

Mr. Pusey said, in the year 1850, "I wish I could report any progress in our knowledge of the clover-sickness, by which the growth of clover is almost stopped on some light-land districts of the north, especially Yorkshire, and for which every remedy proposed has hitherto failed; it is only mentioned here in order to stimulate, if possible, further endeavour to fill up the blank in our scientific and practical knowledge."—*Journal*, vol. xi. p. 433.

Although a digression from the immediate design of this paper, we are tempted to offer the following remarks, collected from trustworthy sources, which, though simple in form, and prescribing an equally simple remedy, may pave the way for further research, and be a guide to farmers in selecting their clover-seeds.

And first with regard to red-clover. The clover-seed sown by the farmers of Yorkshire is chiefly of foreign growth, one-fourth English to three-fourths foreign. The crop of English clover is very precarious, but when the seed is of good quality and well harvested it is preferred to foreign seed. It is grown in the South of England, and bought by the dealers for consumption in the North, and, in consequence of the supply being limited, commands a high price when good. French and Dutch rank next in estimation, and the latter is eagerly sought after by our farmers, being especially suited to the soil of Yorkshire, some preferring the lowland Dutch, others the Brabant or highland seed. The lowland is a healthy, robust, and productive seed, and rarely fails to produce a crop. In appearance it is a bold and large seed, very yellow in colour, but if unknown would not attract the attention of the farmer; nevertheless, it is a favourite when known, and commands a much higher price than the American or German in the Hull market, which is the principal one for the sale of these seeds. Brabant, or highland, is, when of good quality, not unlike English, of a deep purple colour, and a bold seed not unlike the French; but it flourishes best on a dry and warm soil. The Scotch farmers, who never sow anything but the finest seed, buy largely of this, and, when the supply is but scanty, will pay very high prices for it, rather than use any other; hence it happens that very little has been seen in the Hull market of late years, and then always at an extreme price. German and American are often fine in quality, but always small in size; they have a considerable sale, but adulteration is much practised. In seasons of scarcity trefoil is added; this may be detected by the smell and the shape of the seeds. The Belgian seed is frequently so mixed, and even occasionally the lowland Dutch, which, as was stated before, has a yellow or trefoily appearance; but a judge will detect the adulteration by the shape and smell, trefoil being round, the genuine clover being oval and much bolder. American seed is said to be hardy, but we can give no proof of its being so.

White clover seed.—The great bulk of this seed comes from Germany, Belgium sends a fair quantity of good quality, and Holland a little occasionally. There is no seed equal to the Friesland White, but it is only in very fine seasons that any is exported; last year, however, a quantity arrived and commanded a high price; it is to be hoped the cultivation of this variety will be extended, for it is particularly suited to these districts, being hardy and productive; in appearance it is brown, large, and of a fine quality. Of the large supply from Germany, containing almost every description of quality, we give the preference to the Silesian, which is generally well ripened, more free from weed-seeds than that from other districts, and seldom adulterated. Much disappointment and failure in our clover crop may be prevented by the exercise of a certain degree of caution in purchasing seed only from trustworthy dealers; if cheapness be the only desideratum, the result is almost invariably a failing crop; let farmers sow a less quantity of seed of the best quality; the cost will then be little more than that of a larger quantity of inferior seed, the result a good crop of clover.

The example of the Scotch, who only buy the finest quality at a fair price, is worthy of attention. These cautious farmers, if not sufficient judges themselves, give their orders into the hands of a respectable dealer, who guarantees the genuineness of the seed, and finds his own interest in serving his customers well. Foreign seed is also well machined or cleansed from deleterious seeds by those dealers who guarantee to sell the best quality. Farmers are generally particular in the selection of seed for their grain crops; the same caution is doubly necessary with regard to clover-seeds; and if this caution were exercised in our home markets, the attention of farmers abroad would be given to the importance of well cleaning and preparing the land destined for seed crops, so as to meet the requirements of our trade.

The same caution is required in selecting Italian rye-grass, kohl-rabi, turnip, and mangold seeds; quality and excellence must be considered before price, or to save 3*d.* per pound a great loss may be incurred.

Not to enlarge further on this topic, especially as it is the subject of a separate paper in this Journal, we will conclude by quoting some remarks on adulteration made by the writer on Norfolk farming (*Journal*, vol. xix., p. 278). He justly says, "We try all sorts of manures for all sorts of purposes; some is purchased because it is cheap, some to serve a needy friend, some because the agent is a respectable man, some because it is horrid-looking stuff, some because it has a very revolting odour; and there are many other reasons, too numerous and too absurd to mention. Now all these ways are wrong ways. The right one is to *buy only by analysis.* Science may have made its false step; Lawes and Liebig may have differed; abstract theories may not always have borne practical fruits; but still chemical knowledge is the only way by which we can arrive at the real value of the artificial manures." The farmer who neglects this warning may experience a double loss: the cost of the outlay in the first instance, and next the failure of the crop intended to be benefited; whilst the alternative suggested is not a costly one, when for a fee of 10*s.* our members may procure an analysis by the chemist retained expressly for this purpose by the Society. Let a vigorous stand be made against adulterations and adulterators, and let it be maintained till the tribe of them cease to be found in the land.

Guano is not so extensively used in the county as it was a few years ago, principally on account of its present high price, though a few still employ it when planting potatoes, or as a top-dressing for wheat, and sometimes for spring corn. Nitrate of soda is also used when its price has not, as of late, been too high to yield a profit. Both the guano and nitrate of soda are mixed with an equal weight of common salt. Guano is very extensively used for potatoes in the marsh-lands. Phosphate of lime is much approved of for most crops; its influence is less impaired by a dry season, its action is more enduring in the land, and its effects never disappointing, but to ensure these it ought always to contain from 50 to 60 per cent. of phosphate of lime. The best is made from bone-ash, which in the state it is imported gives on analysis 80 per cent., or seldom less than 70 per cent., whilst ground bones seldom yield more than 50 per cent. of phosphate. Rape-cake, besides being extensively used for feeding cattle—a use which is every year increasing the consumption—is applied with great advantage for grass-land as a top-dressing. Wherever guano is used with benefit, there also may rape-cake at a cost of 5*l.* to 5*l.* 10*s.* per ton be economically applied; a large quantity is now annually manufactured in the county both from German and East India seed, the latter being most in request for manure, as being equally efficacious and rather cheaper than green cakes.

We must now consider the recent improvements made on the low lands, and first on pastures. The want of drainage and manure, combined with constant cropping or eating off, had reduced the quality of a large proportion of grass-land to the lowest point, and improvement became imperative. An unfounded prejudice long prevailed against deep draining on grass-land, and on most farms the arable land was first taken in hand as being the most important; whereas no part of a farm yielded a greater return or sooner repaid the cost of draining than the grass. A four feet drainage, followed the succeeding year by a dressing of lime and compost, with either 5 cwt. of phosphate of lime or an equivalent in bones, has been proved to double the value of the land, and it is with much satisfaction we record that a great number of acres have been so treated since deep drainage became general. An improving tenant farmer showed us a grass-field of naturally good quality, which his landlord had drained the previous year. He had taken some superphosphate of lime, made from bones dissolved with sulphuric acid, and spread it on the grass in the form of the initial letters of his name. When the cattle were turned in to graze, the grass so treated was both longer and greener than the rest; and was soon found out and preferred by the stock. The result was so satisfactory, that the farmer intended to dress the whole field in a similar manner.

On arable land draining became an absolute necessity, and 1848 marked the commencement of a new era in the history of farming; the work was begun in earnest by the landlord and the tenant, the country at large reaping the benefit. No district offered greater advantages from deep drainage than the Vale of Cleveland, where the work has been carried on with much spirit during the last ten years. Previously, nearly the whole district was farmed under the old ridge-and-furrow system, with water grips and open ditches; no crop was ever expected to grow in the furrow, and the consequent deficiency in the yield per acre was considerable. Draining the furrows and filling up the ditches increase the breadth of available soil, besides greatly improving the quality of the grain. Another result of this improvement is the increased growth of roots, whilst a gradual amelioration of these strong lands is being effected which will enable the farmer to adopt other improvements practised in those districts which have been longer under the influence of effective drainage. Six per cent. is charged by many landlords on the cost of drainage in this part of Yorkshire.

The North Riding is better adapted for breeding than for the growth of corn, in consequence of the variety of soil and subsoil in the same field, the limited extent of the farms, and the peculiarities of climate; and to such purposes it no doubt was formerly appropriated. The high price of grain, however, between 1790 and 1812 induced the occupier, when not restricted from so doing, to take every opportunity for converting into tillage every kind of land, to his own immediate profit, and the ultimate loss of the owner. Efforts are now being made to introduce improved cultivation by throwing together small farms and erecting suitable farm buildings. These spirited endeavours do not, however, find much favour in those districts; it seems almost hopeless to attempt to change the habits of a considerable class, and landlords, meeting with little response at home, are constrained to look abroad for suitable tenants.

A great part of this county had been laid down probably centuries ago in what are termed "lands;" on these Parkes's principle of deep draining was at first carried out regardless of the ancient furrows; nearly all the lands so drained have required redraining, for in course of time the drains on the strong lands ceased altogether to run: the remedy for this was draining up the ancient furrow. Where there is a good outfall the immediate effect of this system is a complete abandoning of the summer fallow and the increase of the root-crops to four or five times the former growth, these being followed by a crop of corn and clover with the best results. "Use no manure till you have drained" has become the farmer's proverb. The use of lime for fallows has been revived of late, its consumption having at first much decreased upon the introduction of hand-tillages. The farmers are also become aware of the importance of deep ploughing and the mechanical working of the land by drags and harrows, so as to improve the seed-bed for the following crop. Owing to the lateness of the last harvest many tenants took advantage of the permission given to stack their corn in the fields: under such a season this was perhaps desirable, although, as a rule, we like to see the crop under the eye of the farmer, and near the homestead; it looks and is better, leads to less waste in using the straw, and less injury to the land than when carted in the winter.

On well-managed farms stubbles are scarified immediately after harvest, and if intended for a root-crop, deep ploughed before the frost sets in; the rest of the ploughing follows as quickly as possible, in order to finish before winter and to allow of early operations in the spring. Winter beans have of late been much grown, and sometimes yield a heavy crop; but it is important for them to be sown immediately after harvest, as, if deferred until the frost sets in, they not unfrequently fail. Winter tares or vetches are treated in like manner, and are great favourites with all lowland farmers: some sow them in the spring. These crops are generally highly manured, and are followed by a crop of wheat.

The use of the presser on strong loamy soils is general when wheat is sown. The favourite course on strong land is the five-field shift, often expanded into a sixth-course, thus:—1st, roots eaten off or removed; 2nd, wheat, barley, or oats (frequently the former sown with clover-seeds either to mow or graze), manured in the autumn, and sometimes salted or limed; 3rd, wheat; 4th, beans; 5th, wheat: or else—1st, roots; 2nd, wheat; 3rd, oats; 4th, seeds; 5th, wheat; 6th, beans. We have also seen the following adopted as less exhausting than this course, viz.: 1st, roots; 2nd, wheat; 3rd, beans; 4th, oats; 5th, seeds; 6th, wheat. These crops are all manured (the true receipt for ensuring a profitable return); the roots with 10 to 12 tons of well-made dung, 8 to 10 bushels of half-inch bones or 5 cwts. of superphosphate, 3 cwts. of Peruvian guano or 5 cwts. of rape-dust, to the acre. Seeds require a good dressing when not eaten off, and even when grazed, unless linseed-cake has been freely given to the sheep during the summer. Beans well repay the expense of manuring, and the same may be repeated of every crop.

On well-drained and properly managed farms the produce of wheat varies from 36 to 40 bushels per acre: in some instances a higher estimate may be taken, while 20 to 24 bushels is the yield on those less cultivated or ill managed. The yield of oats is frequently 80 bushels, against 35 to 40 on the old-fashioned system, and of barley 60 bushels. Few changes have been made in seed-wheat since the last Report, though a greater quantity of the white sorts is grown than formerly. In oats and barley there is no change. We have no statistical reports or reliable data for estimating the increased produce of the county in general. Whilst such returns are withheld any attempt to give an estimate would be mere guess-work. To show how valueless these estimates frequently are, we noticed that, in a report made some years ago, the quantity of grain sent by water-conveyance from the chief market-town of the district, through a series of years, was made use of to ascertain the production of that district, no allowance being made for the seed introduced nor the quantity delivered through other channels. This is not the time nor place to discuss the advantages or drawbacks of statistical information, even when legally enforced; but we may be allowed to say that the returns are worthless if inaccurate and incomplete; whereas no plan that we have seen appeared likely to realise these conditions. In estimating the increased yield of crops we have been guided by information received from the growers: when they tell us of their increase, we think no better evidence can be required. On these strong, heavy soils wheat is more frequently grown than either oats or barley.

Turnips.—With turnips the results are equally satisfactory, and consequently the number of sheep and cattle now reared and fed on a farm has been often doubled, and we believe there is room for still further increase. Of late years a considerable breadth of land has been sown with mangold in preference to turnips, the oval-shaped variety producing the most abundant crop; but their more extensive cultivation is checked by the belief that they impoverish the soil for a following crop. We ourselves give the preference to swedes, which the experience of others confirms, and consider that a good crop of swede turnips (Skirving's Improved) is more profitable if the following crop be kept in view. A new kind, called the Devonshire Greytop-stone, has always produced good crops on the Wolds, and the demand for it is annually increasing.

During the late wet season the good resulting from drainage was proved by our comparatively small loss in sheep when compared with that of former rainy seasons.

Hay.—The high price and great demand for hay has done much to turn attention to the manuring and management of meadows so as considerably to increase the crop. Around the large towns in particular the demand for dairy produce has so largely increased, that the dairymen, who a few years ago frequently sold the chief part of their manure, now retain all for their own land.

Field-Peas.—Field-peas are extensively grown for the consumption of the population in towns: they are generally sold by the acre, the buyer employing labourers to gather them, and the farmer carting them to the town. When a fair crop they pay extremely well.

Potatoes.—The growth of potatoes in marsh-land and along the principal lines of railway for the markets of the West Riding and Lancashire is very large. The disease, however, which of late has affected the potato proved last year most extensive and destructive, spreading over the whole county, on all kinds of soil, under every description of cultivation. The exemption of Scotland from the malady which extended all over England will perhaps cause some light to be thrown on this perplexing subject. During our stay in Scotland last October we had an opportunity of inspecting many farms, and better crops of potatoes and turnips we never saw in that or any other country. In the county of Wigton, the East Lothians, and part of Perthshire, the crops for size and quality were wonderful. Is this owing to the influence of the climate? The potato is without doubt the most valuable of root-crops: the evil that would arise from its total failure incalculable.

The first potato which became noted in the London market as the produce of the district round Goole and on the skirts of the river Ouse, from Trent Fall to Selby, was the red-nosed kidney—a most prolific and mealy potato, originally introduced from Berwickshire; at first the custom was to obtain every year such quantity of fresh seed that the produce arising therefrom would insure sufficient sets for the next year's crop. After a few years' cultivation, however, this kind degenerated to such an extent that the farmer was compelled to procure the whole of his seed fresh every year. The deterioration of the plant was in the first instance only observable by a curled small leaf, and a considerable deficiency in produce: in a little time the seed altogether failed, and fresh plants were procured from the north-west of Scotland; these were shipped from Fraserburgh, Peterhead, and Aberdeen. The seed, however, held highest in estimation was that obtained from the mossy or peaty land beyond the Grampian Hills running down to the sea-coast: these likewise in about ten years shared the fate of their predecessors; but the disease assumed an entirely distinct form, viz., that of a dry decay of the tuber, which usually commenced shortly after cutting and planting if the weather were warm. In 1832 the kidney-potato was generally abandoned for a round, deep-eyed, rough-skinned potato imported from Perthshire. This, like the kidney, improved in value from the change of climate and soil, always fetching, when sent to the London market, 20 to 30 per cent. more than the produce of the county of its origin: these were known by the name of the Scotch reds; their average produce was generally not less than 10 tons per statute acre, whilst in some instances 14 tons have been grown. The seed had to be changed every year, and, in 1840, symptoms of dry-rot appeared both in the sets and curled tops of the growing plants; to obviate this the seed was then procured from the Highland districts extending from Blair Athol to Aberdeenshire. The disease, in the form in which it now prevails, was observed in Perthshire in the spring of 1844, where, on opening some of the pits, discolouration below the skin appeared, which at that time was attributed to the weather, particularly to the frost. In the following year, however, thousands of tons of the red potatoes in that county, which had been taken up apparently sound, became in a few weeks one mass of corruption. Many attempts were made to re-establish this valuable potato by autumn planting, selecting particular roots, raising from the apple, &c., but all without effect. The regent, an oblong, rough-skinned, small-eyed potato, of unknown origin, was next cultivated: in appearance it somewhat resembles the shaws and the Cheshire white; it was extensively grown from 1846 to 1856 with occasional failures; it is not a prolific potato, an average crop being about 6 tons per statute acre; it is now more or less subject, according to the atmospheric influences, to the blight in the haulm and decay of the tuber, and the last year may be said to have sealed its doom as a staple commodity. In 1852 the fluke, a dry, sweet, rather yellow-looking potato, was introduced out of Lancashire, and is a great favourite in the London market. At the spring of the year a large breadth of land is now cultivated with this description of potato, notwithstanding the expense attendant on the seed, which will not produce from more than one eye. Even this potato is showing symptoms of decline; and a new kind called seedlings, a round, small, slippery-skinned, unserviceable potato, was some time ago introduced, which has been for the last two years comparatively sound, but is not, and never will be, a favourite in the London market. Many other kinds, such as the ox-nobles, Cheshire whites, green-bulbs, shaws (once extensively cultivated for cattle food), lapstones or kidneys, protestants, and the rocks, have at various periods appeared in the district near Goole, but never so as to supersede those we have described. It is curious likewise to remark the different cultivation of the potato within the last thirty years. Up to 1832 the land was ploughed four or five times in the spring, and afterwards rolled and made very fine: the usual time of planting was from the middle of April to June, but experience eventually showed that potatoes planted when the land was damp and cool best withstood the dry-rot; hence a change was made, from the time above stated, to the period between the middle of March and the end of April. Last year operations were commenced in February, and finished the first week in April. The first-ripened potatoes invariably stand the epidemic the best; but so great are the vicissitudes of this plant, that on the same farm, under the same culture, one portion of the crop has realised 40*l.*, whilst the other has not produced 6*l.* per acre. We are informed by an extensive farmer and land-steward that he has tried on a small scale all nostrums, planted at all seasons, used a great variety of manures, and has experienced diametrically opposite results from the same experiments: on one point he was very forcibly convinced, that whenever the plant suffers most the atmosphere is highly charged with electricity; it likewise suffers from all extremes—from that of wet by decomposition, and that of drought by stoppage in growth.

Flax.—The cultivation of flax in the county has been steadily increasing during the last twelve years, the variety of fibrile textures into which it is introduced and its high price giving an impulse to growers. Yorkshire has long been known for the fine quality of this plant, which under the new system of management is considerably improved. The quantity sown is much influenced by circumstances, such as the price it realizes, and the value of other kinds of agricultural produce, and fluctuates with each particular season. On the banks of the Ouse and Trent, where the cultivation is considerable, the importance of this crop has increased with the failure of the potato. Improved machinery for scutching flax by steam instead of hand power has contributed to make this a more profitable crop than formerly. Considerable prejudice still exists among some landowners to this, as an exhausting crop; but the discoveries of science have done much to dispel the feeling, although some persons devoid of experience still cling to the notion that it is baneful to the land. The repeated growth of flax on the same land is unprofitable, because quality is then sacrificed; but, taken in due course, this does not interfere with the production of other crops satisfactory both in quantity and quality. It seldom, if ever, occupies the ground more than four months, and therefore allows sufficient time in average seasons for a good fallow previous to the wheat crop, which experience proves to be its best successor. Should the root-diseas econtinue, the southern counties will probably adopt flax culture into their course, but we should recommend them to grow the plant not for its seed only, but to keep in view the importance of the fibre, which the advantage of railway conveyance will in many cases place within reach of steam-power.

It is but fair, however, to state that this has been the subject of much controversy. The matter was fully discussed in the year 1845, in a paper brought forward by Mr. Wells, of Booth Ferry, which is to be found in vol. xvi. of the 'Farmer's Magazine,' together with many letters on the same subject by the advocates of flax culture: the reply of Mr. Wells is also published in vol. xvii. of the same magazine. Unfortunately the unfavourable results there anticipated have been fully borne out in that district. The extensive flax-works at Rawcliffe, Fairfield, Selby, River Bridge, and Pocklington, in which reeling and scutching by steam-power were to compensate for the lowness of price, have all proved failures, and, with one exception, are all closed; Messrs. Marshall, of Patrington, however, still have large quantities of line, but the district in which their works are carried on seems to be fatal to their securing the growth of line off the warp-land districts: local buyers on the old system, since the price rose ten years ago, beating them out of the market. Around Crowle the growth is increasing.

The repeated failure of the turnip crop has stimulated the farmer to try again those roots which will best supply his wants. The kohl-rabi has this year proved invaluable in some soils where turnips have failed.

Holcus saccharatus.—The Holcus saccharatus, which was introduced from China a few years ago, seemed likely to be a useful forage plant. The cattle and horses like it, and it is good especially for milch cows; still it is too tender to be grown successfully in this county. Frost is fatal to it; and, though in a suitable climate it attains the height of 12 feet, the cold and wet of this summer prevented its reaching as many inches. The quantity of seed sown per acre is 10 lbs.

Chicory.—Chicory was grown very extensively some years ago, but, as the cultivation has now considerably diminished, we notice the fact without entering into a lengthened detail of its introduction and subsequent abandonment, observing briefly that the alteration made in the duty, and the regulations of the excise, render it no longer as profitable as formerly.

Horses.—"Yorkshire doth breed the best race of English horses," wrote the judicious Fuller; and the same may be said in the present day. Some of the ablest pens have loved to write of the wondrous feats of a favourite steed. Southey describes his favourite "Nobs" in the 'Doctor' with a touch of feeling, minuteness of description, and skilful handling, that make you almost fancy the horse before you, with his owner expatiating on the good qualities he had, and the bad ones which he had *not*, till you become almost as much imbued with love for the horse as the writer evidently was:—

> "He was fit and powerful for the road,
> Blending mighty strength with fleetness, high in courage and in blood,
> Free from all the well-known vices, broad of nostril, large of jaw,
> With the ten good marks distinguished."

We believe "Nobs" was a genuine Yorkshire horse, and no other county could produce his like.

Race-Horses.—Of the race-horses which are bred and trained in the neighbourhoods of Malton, Beverley, Doncaster, and in many parts of the North Riding, we need say but little. It falls, however, within our province to remark that the thoroughbred horse to be used as a hunting sire ought to be selected with much more care than the breeders seem to think necessary. They too often look for a fashionable pedigree, a large size, and good colour, and disregard soundness and good action, to the dissatisfaction of their customers and their own loss. "Country" stallions of good form and action, though with less fashionable pedigrees, would give more satisfactory results. We need not notice this subject further. The turf has its own literature, and to it we must refer those readers who are specially interested in the subject.

Hunters.—The hunter is generally bred by the farmer; the demand for strong animals capable of carrying heavy weights having been on the increase, large sums are paid for them. Let these be well made with good bone and sinew, well up to 12 or 13 stones, and able to keep up in a good run, and the fortunate owner may demand from 200 to 300 guineas. The high price offers every inducement to the study of cross-breeding with a view to such animals. They surpass the hunter of former days, being more enduring throughout a hard day, carry heavier weights, come home fresher than formerly, recover themselves sooner, and are superior in every respect to their predecessors in the hunting-field of twenty years ago. In the lighter breed we do not observe any difference.

Riding-Horses.—The old-fashioned strong and heavy riding-horse is not so much required as formerly, but, when perfect, is still very valuable. Breeders are too commonly wanting in that careful selection of the sire and dam which is essential to success and profit. Both breeders and riders agree that the difficulty of securing horses that can hunt or hack yearly increases. It is a common remark, which in part explains the high prices given, that "we have not improved in this county in the breed of this class of horses."

Hacks.—A few words will embrace all that can be said of the common hack. Being the offspring of all kinds of stock, they are as multifarious as their riders, each one gratifying his own taste in selecting his horse. The genuine "cob," which can trot fast and safely, was never in better demand than now, nor realised higher prices.

Carriage-Horses.—Carriage-horses are of a lighter make than formerly; and although the old Cleveland bay is not yet quite extinct, yet for the London market and for carriage use he has been voted too heavy. The old family-coach having given way to the lighter brougham, a different description of horse is required; and the race, once the pride of Yorkshire, is no more "the fashion." The hunter class is now required for harness, and demands the same attention in the choice of the sire as the true hunter.

Blood-Horses.—For all the above-mentioned classes of hunting, riding, and harness horses, the blood-stallion is required; but the farmer who in his selection mistakes cheapness for economy, neglects to exercise his own judgment, and relies on reported performances on the turf to direct his choice, will too often be the dupe of designing persons, and only rear animals which deteriorate the breed.

The cross between the Cleveland bay and the small, compact, thoroughbred keeps up its character: for such, high prices are paid, ranging from 100 to 200 guineas. They are most prized when about or under 16 hands, with light step, and quick, high action. The North Riding, Howdenshire, and Holderness, are the chief breeding-grounds for hunting and carriage horses.

Cart-Horses.—Drainage and the use of improved and lighter implements of husbandry have caused a corresponding change in farm-horses, which are now bred to combine strength with speed. The old, heavy cart-horse is gradually giving way, to the regret of some, who think this a falling off. But custom is seldom at fault; circumstances must influence the breed; and if a farmer finds that with a pair of horses of a lighter kind, requiring less keep, he can plough a quarter of an acre more a day, he will breed them in preference. So far the breed is undoubtedly improved; but we must admit there is a danger of going too far. The Clydesdale breed, remarkable for their hardihood, stoutness, and good action, has been introduced with the best results; but farm-horses are bred all over the county without any distinguishing characteristics, the Flemish and Suffolk mares having lost their individuality in a variety of crosses.

The principal horse-fairs, Howden, Boroughbridge, Northallerton, York, and Beverley, continue to maintain their reputation for excellent horses, and have of late years been much resorted to by foreign dealers, who give large sums for a first-rate animal.

Cattle.—The breed of cattle throughout the county is almost exclusively the short-horn: a few cross-breds find their way here from Ireland and Scotland; and of the former it may be said that, while the number has lately diminished, the quality has improved. Looking through the prize-lists of the annual exhibitions of the Society for the last twelve years—1848 to 1859 inclusive—the following results appear. Yorkshire breeders, or cattle bred in the county, have obtained—

Two 1st-class prizes for aged bulls.
Four 2nd-class " "
Five 1st-class prizes for yearling bulls.
Five 2nd-class " "
Two 1st-class prizes for bull-calves.
One 2nd-class " "
Three 1st-class prizes for cows in milk or calf.
Seven 2nd-class " "
Four 1st-class prizes for heifers under 3 years old.
Four 2nd-class " "
Four 1st-class prizes for yearling heifers.
Four 2nd class " "

A result highly creditable to the county. In the twelve exhibitions Yorkshire took twenty first-class and twenty-five second-class prizes in six classes.

Short-horns.—The fashion for short-horns—for that is the term applicable to the highest specimens of this far-famed breed—is deeply rooted here, and the most eminent breeders reside in the county. To pay for "fashion" it is no uncommon thing for the leading breeder to receive 200 guineas a year for the use of a single animal, and there is such competition for bulls, that many of the highest personages in the land are glad to enter their names on the list for a supply when their turn comes. Every year brings an increased demand and higher prices are paid. Twelve years ago 100 guineas was the largest sum that was given; the amount is now doubled, and even at this rate the supply of first-rate bulls is not equal to the demand. If the adage "The worth of a thing is what it will bring" applies to short-horns, then they are valuable indeed. We believe that in this instance purchases not only satisfy this test, but that a large profit is secured to those who invest their money in the best animals.

As a general rule farmers are not careful in selecting the males. A few pounds more will often deter them from buying, although, when they are spirited enough to do so, they find they derive the most profit. The breeders of these "fashionable" animals justly merit the renown they have acquired; it was not without much care and expense that such perfection has been obtained. When one is calved of the right colour, free from blemish, and of good pedigree, on such an animal no expense is spared in the rearing. It is fed on new milk twice or thrice a day, and in ample quantity; cream is even said to be sometimes added; a lump of chalk is left in the crib to prevent acidity; plenty of the best hay, ground oats, beans or malt and linseed-cake are given as soon as possible, so as to ensure rapid growth, and the development of those "points" of excellence which alone bring success to the careful breeder. An income of from 2000*l.* to 3000*l.* a year is said to be the sum obtained for "lettings" which a leading breeder obtains; nor is this undeserved: it is the result of nearly a century of judicious crossing and careful selection—evidence at once of the room there was for improvement, and of the willingness and discernment with which the public recognizes and rewards perseverance and energy.

The greatest advance of the last few years is to be found not so much in the fashionable blood itself as in the general diffusion of the breed, extending even to the animal that grazes the lanes as well as the richer pasture of the farmer. In the mode of feeding for the butcher, or the breeding and rearing of cattle, we have little new to add to a former record (*Journal*, vol. xix., p. 500). Early in last year we paid a visit to Mr. Horsfall's farm at Burley, near Otley, and carefully investigated the practice carried on there in the feeding and fattening of cattle, which has already been fully described in this Journal; we have since adopted, with such modifications as were suited to our farm, his valuable suggestions. The failure of the swede turnip, to the extent of half an average crop, and the high price of cattle food, have obliged us this winter to provide a substitute; we therefore commenced steaming, making use of malt-combs, inferior hay, green rape-cakes, pulped turnips, a little salt, and lastly straw cut with Corne's chaff-cutter. The quantity consumed in one [illegible] has been carefully weighed; and as it fully met the requirements of our animals, a statement may enable our readers to form their opinion of its value, according to their own peculiar circumstances.

Tons.	cwts.	qrs.	lbs.	
2	5	0	0	of cut straw.
0	6	1	20	green rape-cake broken into small pieces.
0	4	2	0	malt-combs.
0	9	0	0	cut hay.
0	1	2	0	salt.
3	15	0	0	pulped swede turnips.
7	1	1	20	

The weekly consumption per head is about 3 cwts. of the entire mess, divided amongst bulls, cows, steers, and heifers, in number 37, 6 yearlings, and 4 calves.—in all 47 head. They thrive and do well on this food, the milkers give an increased quantity of milk, and the holding stock are looking better than we ever remember their doing on the old plan.

All the food, with the exception of the turnips and malt-combs, added afterwards, is steamed from three to four hours every other day, and the mixture, which is given before it is quite cold, is eaten with an eagerness which proves how the cattle relish it.* The present high price of linseed-cake makes the above a comparatively cheap food for holding stock, but in a season when we have plenty of roots, good hay, cheap linseed cakes, and sufficient straw, we shall regulate our system accordingly. The malt-combs are now selling at 6*l.* to 7*l.* per ton, the demand being unusually great. The price of coals being high in our district, fuel becomes an important item in the calculation, and will always influence and perhaps regulate our wish to continue steaming; but that in the present conjuncture it is both economical and serviceable to us we confidently affirm. The working of the steaming apparatus exceeds our most sanguine expectations. After visiting Burley we were prepared for good results, but the economy and efficiency are greater than we anticipated. The steaming economises the straw, makes the food palatable, easy of digestion, and nourishing; the cattle so fed are not exclusively for dairy purposes, but for growth and feeding; by Mr. Horsfall's plan we are able to attain these results with greater speed and economy than by the previous plan of cut turnips, chopped hay, and linseed-cakes. Our expense of erecting a steamer was not great; as we had a boiler, it was simply needful to fix a two-inch gas-pipe from it to the steamer, which is made of bricks laid in cement, having a heavy and close-fitting cover or lid, and a small opening at the side through which the [illegible]med mess is drawn out as required, whilst the bulk of food prepared at one steaming is kept warm during the two days. This is a variation from Mr. Horsfall's plan, consequent on a difference in shed arrangement. The introduction of steamed food is dependent on the same principles which regulate the entire economy of the whole farm. The skill of the intelligent farmer is never shown with more effect than when thus exerted in adjusting his operations in husbandry to the ever-varying changes of climate, and applying the lessons of science to the selection of implements, manures, and crops best adapted to maintain the fertility of the soil, and develop its resources. The fluctuations in prices and manure must be met by corresponding changes in consumption. A dogged pursuit of one system of cultivation, though not bad in itself, must ever be attended with serious drawbacks from changes of season and of circumstance. In no respect is the growing intelligence of the age more clearly indicated in contrast with the habits of our ancestors than in the exercise of this discretion in modifying our practice. By this standard our use of steamed food must be estimated, its value being contingent on a like good result being attained by the substitution of less costly materials.

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* Experience has proved that turnips and malt-combs are better not steamed.— . W.

Sheep.—Our principal breeds of sheep are the Mountain, Cheviot, Barnshire, and Leicester, with a variety of crosses from these and the Southdown, which vary in different parts of the county, as will be hereafter specified. The higher ranges of hills in the West and North Ridings are grazed by mountain sheep; a cross between the Cheviot and Leicester is found on the high-lands, which are draughted off to the lower districts, and find their chief market at York. The reputation of the county for its breed of sheep is well sustained at the Royal Agricultural and other shows.

A greater weight of mutton and wool being the desideratum, efforts are constantly made to obtain them by crossing and using heavier rams; in this respect, however, our gain is probably not so much in weight as in numbers. There is a larger number of breeders, and these again keep larger flocks of ewes; thus the markets are more freely supplied, not only with sheep, but also with lambs, the demand for which in the West Riding markets is very extensive, both from the increased population and the greater demand for meat consequent on a flourishing state of trade.

We have before us some statistics of the leading markets, showing the increase in the consumption of beef, mutton, and corn since the year 1848, but they are so conflicting and doubtful that we set them aside as useless for determining the native produce, no sufficiently distinct account being kept of foreign, Scotch, and Irish importations, whilst recent changes in the Leeds and Wakefield markets tend further to confuse the account. The farmers (especially on the Wolds) prefer the

Leicester sheep, and breed as many as the farm will keep; the lambs are usually weaned in July; put first on clover-fog, then on rape, followed by cut turnips, with an allowance of linseed-cake, which is increased in quantity till they each consume half a pound daily; this continues till clipping-time, which takes place in April or May, after which they are sent to market. This system is practised from Bawtry, in the south of the county, to Wetherby in the north, and on the west it extends as far as Wakefield. The increased growth of roots supplies them with winter food, and in case of a wet season in the low grounds they are removed to grass-fields which have been drained. One of our largest lowland farmers mentioned to us that on his farm of 1000 acres, now well drained, he has kept his sheep healthy and thriving during the last wet year, although his father on the same farm once lost his entire flock from the wetness of the season. We adopt this plan with great success; the sheep have their usual allowance of cut turnips and linseed-cake given them on the grass-land, care being taken to have a few heaps of turnips ready for the time of need by taking them up and carting them during the first frost to avoid injuring the land. The plentiful keep which deep drainage allows the lowland farmer to provide for his sheep, induces him to have a stronger animal, and many farmers now obtain their rams from Lincolnshire; they can bear better food than the fine and smaller Leicesters, and are not so liable to rot. Others again buy Lincolnshire ewes and put them to a Leicester ram to obtain a longer staple of wool, but the custom is not general.

In the parts west of Wakefield it is usual to buy Barnshire ewes, sell the lambs to the butcher as soon as they are fat, feed off the ewes for the same purpose, and then buy a fresh stock for another year. Some farmers prefer what are called north or cross-bred ewes, a cross between a Northumberland ewe and a Cheviot or Barnshire ram. A few breeders cross a Leicester ewe with a Cotswold ram; the produce is stronger, but not so good a feeder as the Leicester. Perfect symmetry of form, with a heavy weight of wool and lean flesh, may be said to be the aim of the sheep-breeders in this county, and a decided improvement within the last twelve years may justly be recorded. On an estate near Leeds, in consequence of the enlarged size of the farms, thousands of sheep, chiefly Leicesters, are now fed, where a few years ago they only numbered hundreds.

Pigs.—The county is pre-eminent for breeds of pigs; the large Yorkshire and York-Cumberland are well known. On reference to the prize lists of the Royal Agricultural Society, we find that in the "large-breed classes" the large white Yorkshire took the first and second prizes for boars and the first for a sow in 1855, the second boar and first sow in 1856, the first and second boars and first sow in 1858, the first and third boars and the second sow in 1859. Of the small Yorkshire breed, the second prize was awarded for a boar and a sow in 1854; for the first boar in 1855; second prize to a boar in 1856; the first and second for boars, first sow, and best pen of three sows in 1857, and the same in 1858; and lastly, first prize boar, York-Cumberland (Windsor), in 1859; from which it will be seen that our large breed is as fortunate as any of its competitors, and that the success of the small breed is complete. There is also a breed called the Yorkshire middle breed; they are about the same size as the Berkshire, but have smaller heads and are much lighter in bone.

The principal breeders reside in the West Riding, but very excellent stock is found in the other ridings. "Yorkshire stands in the first rank," says a competent authority,* "as a pig-breeding county, possessing the largest white breed in England, as well as an excellent medium and small breed all white, the last of which, transplanted into the south, has figured and won prizes, under the names of divers noblemen and gentlemen, more than in our county; the Yorkshire are closely allied with the Cumberland breeds, and have been so much intermixed that, with the exception of the very largest breeds, it is difficult to tell where the Cumberland begins and where the Yorkshire ends. These improved large Yorkshires are principally bred in the valley of the Aire and in the neighbourhood of Leeds, Keighley, and Skipton."

To the mechanic and working man the pig has an importance beyond its value in good bacon, for he is "the family savings-bank, the family investment, and the family speculation." To *their* inclination for pig-fancying the county is indebted for the reputation she has won.

Poultry.—The poultry fever, which a few years ago reached its climax, having subsided, the management of the poultry-yard is now more soberly carried on; the movement, however, was productive of good, an improved breed being almost universal. We were much struck with this in many parts of the West Riding, where the cottagers rear some of the very best sorts, and bestow much attention on them. The clever report on the rearing and management of poultry, which appeared in this Journal (vol. xii., p. 161), threw much new light on the subject, and the emulation excited by exhibiting at the county shows has effected further improvement. The recommendations contained in that report are carried out to the present day, and the county is celebrated for the size and quality of the fowls, and equally so for its breeds of turkeys, ducks, and geese, any number of which find a ready sale at the different markets; for the poultry and eggs imported bear a very small proportion to the consumption. But whilst the farmer's wife and daughters endeavour to supply a larger class of fowls for the table and good-sized eggs, their patience and ingenuity have been much tried during the last year; diseases among the denizens of the poultry-yard have been universal, and the cold damp weather fatal to numbers. We are glad to record that the system of penning fowls is exploded; they are again allowed to range at large during the day, to the benefit of their healthiness and productiveness.

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* 'Youatt on the Pig,' enlarged and rewritten by Sydney; published by Routledge. London, 1860.

Cheese.—Though some of the cheeses in the North Riding are excellent, and the well-known "Gruelthorpe" maintains its fame, still Yorkshire is not a cheese-making county, but with regard to the butter we believe no district can compete with the West Riding both for quality and quantity. The increasing population of our large towns, with a corresponding increase in the demand for milk and butter, has stimulated the dairy farmers in the neighbourhood of these towns to increase their productions by a better mode of feeding their dairy cows, and also to provide them with better accommodation.

AGRICULTURAL IMPLEMENTS.

Although the introduction of steam to supersede horse and manual labour in agricultural operations has not been so rapid and complete in this county as in the neighbouring one of Lincoln, and although there are yet remote isolated corners where the steam plough has scarcely been heard or seen, and the inhabitants cherish the belief that the flail is the most economical and efficient means of threshing corn, yet it is satisfactory to report that the important aids afforded us by mechanical ingenuity have not been overlooked or neglected by the generality of the farmers of Yorkshire.

Steam Threshing-machine.—Under this head the most important invention is perhaps that of the portable steam threshing-machine. Its introduction dates from the years 1851 and 1852. At the meeting of the Yorkshire Agricultural Society at Thirsk in 1850, the notice of farmers was drawn to portable engines, by the award of a prize to one; and in the following year, at the Bridlington Show, a prize was given to a threshing-machine driven by steam; the Yorkshire Society being a year in advance, in consequence of the Meeting of the Royal Agricultural Society having merged in the Great Exhibition of 1851. The effect of these awards, seconded by the results of experience, was immediately felt; and the books of Messrs. Clayton and Shuttleworth record that three agricultural machines were sent by them into Yorkshire in 1850, twelve in 1851, and seventy in 1852. Since then their use has become general; and where farms are not large enough to keep an engine, there is an ample supply of locomotive engines with the threshing-machines to be let on hire. Many landlords have erected on their farms a complete set of buildings, with an engine to drive the threshing-machine, a mill to grind the corn, and other implements, ensuring convenience, comfort, and profit.

Steam Plough.—The use of the steam plough has hitherto been confined to the strong lands of the level districts, the Wold farmers, who seldom plough their light soils more than four inches deep, still adhering to the two-horse plough, although the large size of their fields, varying from forty to sixty or even a hundred acres, seems to afford a favourable opportunity for the working of its new rival. In the flat tract of country between the Wolds and the sea both Fowler's and Smith's systems have been successfully introduced within the last two years; and the establishment of the manufacture of Fowler's plough at Leeds must conduce to its use in the neighbourhood.

Ploughs and Scarifiers.—The modern improved iron ploughs, Coleman and Bentall's scarifiers, and the best drills that can be procured, are generally used by the improving farmers. In the large fields of the Wold district broadcast sowing is entirely abandoned, and during the last few years the liquid-manure drill has been extensively used, in most cases with good results.

Turnip-cutter.—The practice of bruising oats and beans, and cutting hay and chaff by machinery for feeding horses and stock, may be reported as general throughout the county. Amongst other implements of the homestead, an extended use of the new machine for pulping roots must be mentioned. Of the small implements and machines, it may be observed that a company has recently been established, with dépôts at all the principal towns of the county, for the exhibition and sale, at the maker's price, of the implements in usual demand, so that the farmer has them brought almost to his own door.

Haymaking-machine.—On the numerous grass-land farms in the neighbourhood of the towns, especially near the large manufacturing districts of the county, the use of the haymaking-machine is very general, and extensive growers of hay report that it has repaid its cost in one season. It is almost impossible to overrate the value of a machine which enables the farmer to take the greatest advantage of every moment of fine weather in a very uncertain climate; for the never-ceasing clouds of smoke from the chimneys of the adjacent manufacturing towns cause the absence of rain for more than two or three consecutive days to be a very rare occurrence.

Reaping-machines.—Since the introduction of reaping-machines from America, mainly through the instrumentality of the Great Exhibition in 1851, both the implement-makers and the farmers of this county have taken a prominent part in adapting them to the requirements of British agriculture. In the North Riding, where many of the fields are of moderate size, and where the old ridge-and-furrow system remains, a small, light reaping-machine is used, which cuts the corn only, and requires a man to aid in the delivery. On the extensive fields of the Wolds throughout the East Riding, as well as on the arable farms in the south of the county, those machines are preferred which have a self-acting delivery, being less laborious to the workpeople, and also allowing the corn to be cut and left in swathe for a few hours, if required, before it is gathered up. During the last three years a considerable number of these machines have been worked on large farms, their price and bulk rendering them comparatively inapplicable to smaller farms. This objection is, however, obviated, as in the case of the steam threshing-machine, by persons letting them out on hire, the farmer supplying the horses to work the machine, and the owner sending a man to attend to it whilst working. On some estates the landlords have purchased them, to afford their tenantry an opportunity of hiring. Having cut a great part of our corn with one of McCormick's reaping-machines, we can testify to the great benefit we derived from its use during the late wet harvest. The work was well and quickly done, and the harvest operations were considerably accelerated—a matter of no small importance in a precarious season. Some improvements may, however, be made in its present form, which is unwieldy, and requires much time and labour in taking to pieces for removal from field to field or from farm to farm; besides, the draught is too heavy.

Waggons.—Waggons are generally employed for harvesting both corn and hay, as well as for delivering produce when sold; but for taking manure to the land, and the general work of the farm, one-horse carts are commonly preferred.

The Yorkshire farmers are fully alive to the importance of a liberal education, and many of them send their sons, not merely to superior elementary schools, but afterwards to the best agricultural colleges; others place them as pupils with well-known practical farmers, where they go through a complete training, and learn the improved methods practised in various localities; so that a succession of young farmers are arising initiated in all the modern appliances of advanced agriculture, and not unfrequently in the scientific researches of chemistry, geology, botany, &c. In this way we trust to see improvements still further carried on, each age profiting by the experience of its predecessor.

In the present day there is no indisposition to adopt any new discovery; it is eagerly sought after, but in too many instances as soon laid aside without adequate trial; one partial failure, owing to peculiarity of soil or season, telling unfairly against the new manure or implement. In this way we have seen the horse-hoe, the turnip-pulper, and other useful implements thrown aside, and the most valuable manures regarded as worthless; the growing of the white Silesian sugar beetroot for distilling, and the erection of costly apparatus, now abandoned, may serve as example.

One new feature of our time is the number of farms held by men who have had a mercantile education, who bring their commercial ideas to bear on agriculture; these are generally intelligent men, full of energy and enterprise, not afraid of investing their capital in a grateful soil, who therefore occupy the foremost rank in carrying out hopeful experiments and improvements: the same remark applies to the manufacturer where his tastes lead him to turn farmer.

Another class of farmers must not be overlooked, though now diminished in numbers and importance; we refer to the yeomanry of England, properly so named,—men who farmed their own land, varying from 100 to 200 acres in extent. Whether from the want of sufficient capital, from an attachment to old ways, or mere supineness, this class has generally been behind the times, and thus it often happens that on the decease of the owner his small estate is put up to auction (his children leaving the old home to seek more profitable employment elsewhere), and the land which had been the pride of their forefathers is enrolled among the broad acres of some larger owner.

A decided improvement may be noticed in our village schools. Schoolrooms have been enlarged or rebuilt by the aid of the National Board, and the old incompetent master replaced by a trained and certificated one, the clergy rendering the best assistance to the work. The length of this article prevents our enlarging on this subject, and showing by statistical reports the unmistakable social and moral advance among the working classes, evidenced in part by a diminution of crime, vagrancy, and pauperism.

On Tuesday the 4th of last December, 1513*l.* was paid into the Hull bank for savings in sums varying from 1*s.* to 30*l.*; a large proportion of this sum was received from persons employed in agricultural pursuits; and on the Saturday preceding no less than 2209*l.* was paid into the savings-bank by town and country depositors.

One exception only to this satisfactory picture is to be found in the case of the young unmarried farm-servants, who are often much neglected, and not unfrequently lose the good they obtained at school, from want of encouragement from their masters. An endeavour is made to palliate this evil in some districts by the establishment of evening schools and book societies, but the migratory disposition inherent in this class often does away with the benefit; what is gained in one place being lost in another.

A small but not unimportant improvement has been made in the farmers' garden. Whilst collecting materials for this report we were much pleased at finding well-cultivated gardens beside well-cultivated farms, and, while the useful prevailed over the ornamental, the latter was not neglected. A few flowers well cared for by the farmer's wife or daughters added considerably to the beauty of the scene, and from repeated observation we think it will be found that a good farm and good garden go hand in hand.

For the county of York, Leeds and Hull are the chief marts for those important articles of farm consumption—rape-seed and linseed cake; the increased demand for these articles throughout the country, and especially within this county, strongly indicates the progress of agriculture. The import of linseed into Hull from foreign parts in 1848 was 337,361 qrs., and, in 1860, 529,900 qrs., showing an increase of 192,539 qrs. in twelve years, exclusive of what is imported coastwise or overland from Liverpool, which last year amounted to upwards of 33,935 qrs., making a total of 563,835 qrs. Surely this increase shows that the farmer cannot be fairly taxed with want of spirit. The annual imports of rapeseed into Hull and Liverpool have advanced in the same proportion. The linseed-cakes are consumed at home, and, though a considerable quantity of foreign cake is imported, we find no variation in the supply. Though rape-cake is employed for feeding cattle, by far the greater quantity is used as manure, being broken up to about the size of a nut and strewn on the land preparing for wheat. It is chiefly used in the neighbourhoods of York, Tadcaster, Wetherby, Pontefract, and Doncaster.

If it be asked why has the price of beef and mutton risen, if the farmer has done his part to supply the market, we answer that the grazier has had to contend against events beyond human control. The unusual severity of the winter of 1859 and 1860, and the heavy rains throughout the past year, have been much against them, causing great losses from disease:

whilst sheep have considerably fallen off in weight since 1848 from various causes, amongst others the prevalence of the turnip disease, but still more from the scarcity and dearness of food.

There is one useful lesson we may learn of the manufacturer,—he never stints labour when it pays. Many farmers on small occupations err in this respect, and are parsimonious to their own loss—thinking how to save a man or horse instead of how to employ them profitably. This accounts in part for the decrease of that class of small holders whose aim was cheap farming, and for the gradual enlargement of farms. A good deal of sentimentality has been expended over the decay of the old class of farmers, but if they cease to improve the land—the talent given them—it is only just and right to take it from them, and give it to those who will do justice to the claims not only of the landowner but of the community at large. We feel most sensibly that an old tenantry, when they follow the times, are an ornament to any estate; but it is of the idle, ignorant, and prejudiced tenant, who resolutely defies every advance, that we speak: on such an one we cannot waste one word of pity. One more allusion to the manufacturer, and we have done. He is never *wasteful;* everything is turned to account and used in due proportion. But among farmers how many are careless of their produce, not keeping sufficient stock to consume their straw, and above all taking no pains with their farmyards and buildings to preserve the quality of their manure, besides wasting the land by ill-judged cropping! These instances are exceptional, but we must not forget the shadows which relieve the brighter parts of our picture.

One important item connected with his calling has been much overlooked by the farmer, whether from prejudice, want of education, or of leisure: we refer to the keeping of accounts. A current cash-book, the profit and loss as shown by the balance-sheet at stock-taking, the remainder summed up in "rents,"—one, two, or three rents per acre, as the account appears,—is all that is considered necessary. We do not doubt that a better education, with the adoption of scientific farming, will remedy this defect. For what man of intelligence can be content to guess only at the profit or loss accruing to himself from each of the several very variable items in his system of management? Good accounts, besides being a safeguard for the present, form an interesting and valuable record for the future.

The great improvements noted as having taken place in the short space of twelve years are naturally suggestive of still greater. Onward! onward! must still be the farmer's motto among the great changes which we have in prospect; so that when another cycle has passed, and Yorkshire is again called upon to report its progress, its agriculture may be found to have kept pace with the improvements going on around us in every branch of manufacture and commerce.

In bringing our report to a close, we venture to remind the reader that it has been our task to describe, not Yorkshire farming generally, but that more limited field, our modern improvements; and if in its execution we have failed to give minute particulars, this has been an almost necessary consequence of the rule laid down at the commencement of the paper for avoiding partial reference either to landlord or tenant. We have the satisfaction of feeling that the pleasure which the subject has afforded has been greater than the labour expanded on it, for we can dwell with delight upon improvement in any form, but especially in one so congenial to our own taste as the advancement of agriculture.

Sigglesthorne Hall.

VI.—*Statistics of Live Stock and Dead Meat for Consumption in the Metropolis.* By ROBERT HERBERT.

DURING the first six months of the present year the Metropolitan Cattle Market has been well supplied with beasts, which, with very few exceptions, were in excellent condition; indeed, as regards quality, the arrivals from Norfolk, Suffolk, Essex, and Scotland have never been excelled in any former corresponding period. Considering the inferior condition in which the hay crop was secured last year, and the moderate growth of other cattle-food, this is a highly important result. It shows that our graziers have shown great energy and skill in the production of food, even under the most disadvantageous circumstances; and that, whatever predictions may gain currency to the contrary, prices cannot range above a certain level for any lengthened period whilst capital can be found to meet the demands of the consumers of any kind of food. And here we may remark that much misapprehension has from time to time prevailed in reference to the number of fat and store animals in this country. In 1860, owing to the falling off in the condition of the beasts disposed of, and the unusually high rates demanded by the breeders, it was apprehended that our deficiency was such that it would be found necessary to import large numbers of stock from the Continent, whatever might be their condition, to meet our future consumption. The apprehended deficiency, however, has not had the effect of increasing our importations to any extent; and we believe that very few graziers are to be met with who, from past experience, would run the risk of endeavouring to fatten foreign stock upon any description of land. A few ventures have been made by large agriculturists, but they have nearly all resulted in a heavy loss. It may appear somewhat surprising that foreign stock generally will not fatten in this country; but so it is. Some of our best foreign beasts—those imported from Holland—are peculiarly liable to disease; and, moreover, during the three months prior to their shipment, are principally fed upon grains and distillers' wash. The stock derived from abroad since the commencement of the year has not improved either in weight or condition, but has mostly carried a large quantity of internal fat, and consequently met with a ready sale at apparently remunerative prices to the owners. Some remarkably fine-looking beasts have come to hand from Spain, and been disposed of at an average of 21*l.* each. One extraordinary animal, 135 stone in weight, realised 30*l.* This, we believe, is the highest sum ever obtained for a Spanish bullock. This description of stock, however, is still described by the butchers as weighing "as light as cork;" hence none but good judges are inclined to purchase it. There has been an importation of beasts from the northern departments of France. Most of the animals were eleven years old, and had evidently been worked for several years, as they were without a particle of good or consumable food on their backs. Astonishment was expressed here that their owners should have endeavoured to find a market for them in this country. This stock had the largest barrel we ever saw; and two of the oldest beasts were 5 feet 11½ inches in height. If the French graziers desire to find a profitable market in London, they must send us something superior to this stock, which appeared to have been most injudiciously fed.

The wonderful success which has this year attended the fattening of beasts in Norfolk and Scotland has had the effect of keeping down prices to a comparatively fair level. Those recently realised, even allowing for the high currencies paid for store animals during the greater portion of 1860, must have proved a source of profit. Some of the best Scots and crosses have sold at 5*s.* 4*d.* per 8 lbs., and some prime Herefords and Devons at 5*s.* per 8 lbs. The cross-breds received from Norfolk and Scotland have come to hand in admirable condition—a proof, we conceive, that where the system has not been carried too far, it is an improved mode of production. The future price of beef will much depend upon the power of the Lincolnshire graziers to furnish London with a supply. The "season" has opened extremely well, with about 1500 bullocks in very prime condition. Not a few of them show signs of crossing with the Hereford and Devon breeds, and in all such instances comparatively high rates have been obtained. Our impression is that the Lincolnshire supply, &c., is seasonably large; and that, as the weight of stock is likely to increase rapidly with an abundant pasturage, the quotations have seen their highest range for some time.

The arrivals of sheep in the period under notice have been tolerably good; but really prime stock has continued to be scarce; hence there has been a wide difference between the highest and lowest prices, and a dull trade, except for prime and well-made-up Downs, half-breds, and Leicesters. It is somewhat remarkable that sheep should not have done as well as beasts during the past season. In consequence, however, of the immense quantity of rain which fell last year, the foot-rot has made somewhat severe ravages in some of our leading districts. During the first four months of this year large numbers of rotten sheep made their appearance in the metropolis; but since then rot appears to have almost wholly disappeared; still, the sheep have not fattened so rapidly as could be desired, especially by the public, who complain loudly of the high prices charged by the butchers. Foot-rot has, no doubt, greatly interfered with the production of mutton, and some time must elapse ere the quotations will show much reduction from those now current. The Dutch sheep have not reached us in such good condition as in several previous years; and have consequently met a slow sale. The arrivals from Germany *viâ* Hamburg have continued large, some of them showing signs of a cross with our Down breeds. The prices paid, however, have been very low, viz. from 12*s.* to 27*s.* each. Several thousands have been bought for grazing near London, but they have invariably been sent into the market again after a month's run, without gain to the purchasers. The fall in the price of rough fat to 2*s.* 8*d.* per 8 lbs. (the quotation last year having been 3*s.* 2½*d.*) has tended to keep down the value of live stock, more especially as the gigantic monopoly in the tallow trade has nearly broken down; but even this decline, combined with the present high value of money, can scarcely reduce general quotations. The export trade of the country is improving; consequently, additional employment will be found for our artizans and others, the great mass of consumers in the country; and the demand for meat is likely to continue as extensive as ever, even with an average crop of wheat and a large growth of potatoes.

The lambing season has turned out a most productive one. At the commencement of the consuming period prices ruled somewhat high, but have since then continued to give way, until really prime lambs have sold as low as 6*s.* per 8 lbs. For the most part the lambs are strong and healthy, and they come to the scale extremely well. The following return shows the total supplies of stock disposed of in the great Metropolitan market in the first six months of the present and five previous years:—

Supplies of each kind of Stock Exhibited and Sold during the first Six Months of the following Years:—

	1856.	1857.	1858.	1859.	1860.	1861.
Beasts	115,115	112,309	111,592	113,378	114,702	109,812
Cows	2,977	2,682	2,917	2,977	2,904	3,005
Sheep and Lambs	636,030	536,790	588,758	668,702	662,030	604,650
Calves . ..	6,125	8,420	8,878	7,272	9,515	6,560
Pigs.	15,344	13,240	13,096	14,869	14,201	15,952

The foregoing comparison shows that the aggregate supplies of beasts have fallen short of the five previous seasons; but the deficiency in the number has been more than compensated by the prime and heavy condition in which the stock has made its appearance. In the first six months of the present year the district and Irish and Scotch arrivals have been as under, compared with five corresponding periods:—

"District" Bullock Supplies.

	1856.	1857.	1858.	1859.	1860.	1861.
Northern Districts ..	900	..	4,000	4,000	4,000	4,700
Eastern Districts ..	51,700	60,500	66,890	7,460	68,520	64,060
Other parts of England	13,850	14,490	14,560	19,090	21,420	17,700
Scotland	10,008	8,860	8,456	10,030	5,033	8,712
Ireland	3,400	2,700	4,820	2,217	1,477	256
Foreign	7,830	9,238	5,649	7,580	9,058	12,422

The above statement exhibits a decrease of about 4000 beasts from the eastern districts, and about the same falling off in the arrivals from other parts of England. The receipts from Scotland are about 3500 head in excess of those of 1860. The show of foreign stock has considerably exceeded the five previous years. Ireland figures for a very poor number, viz. only 256 head, against 1477 in 1860, 2217 in 1859, 4820 in 1858, 2700 in 1857, and 3400 in 1856. The total importations of all kinds of stock from Ireland this year have been on a very moderate scale both as regards number and quality, and the bulk of them have been disposed of in the Liverpool, Manchester, and Birmingham markets. The average prices of beef and mutton have been as under:—

Average Prices of Beef and Mutton.

	1856.	1857.	1858.	1859.	1860.	1861.
Beef:—	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Inferior	3 0	3 2	3 0	3 2	3 6	3 4
Middling..	3 10	4 0	3 10	4 0	4 6	4 4
Prime	4 8	5 0	4 6	5 0	5 6	5 0
Mutton:—						
Inferior	3 0	3 10	3 2	3 4	3 10	3 8
Middling..	4 0	5 0	4 2	4 8	5 2	5 0
Prime	5 2	6 0	5 2	5 10	6 2	5 10

Although there has been an important decline in prices in this as compared with last season, the quotations have, we imagine, been remunerative. In some quarters, however, losses may have been sustained, owing to the unusually high rates which prevailed for fat and lean stock in the early part of last year.

Great fluctuations have taken place in the value of meat both in Newgate and Leadenhall markets, which, on the whole, have been well though not heavily supplied. At one period the primest beef sold at 4*s.* 8*d.*, and the primest mutton at 5*s.* per 8 lbs. by the carcase. The quotations now, however, are comparatively moderate.

As the grazing community in this country are deeply interested in the progress of agriculture abroad, we may call attention to some official statistics recently issued in reference to the numbers of beasts and sheep in Holland. From them we learn that in 1860 the total number of the former was 1,213,381, and of the latter only 768,373 head. The supply of beasts here given may be accurate enough, but there is evidently a great inaccuracy in the number of sheep returned. Further, we learn that in 1860 over 200,000 sheep were exported, chiefly to England. If we take the lowest possible estimate of the supplies required for home consumption, it seems impossible that Holland could spare more than a fourth of its whole stock for export: for if exports are to be continued at that rate, on a stock of considerably less than a million of sheep, the whole race must die out. We call attention to these figures with a view to their verification and correction by the proper authorities.

5, *Argyle Square, St. Pancras, London.*

VII.—*On the Rearing of Calves.* By THOMAS BOWICK.

PRIZE ESSAY.

OWING to the increasing consumption of meat, and the comparatively early age at which ripe beasts are brought to the shambles, "the rearing of calves" becomes more and more a subject of importance, and worthy of the attention of the leading agricultural society of the kingdom. Not that there is any need to enlarge on the getting up of stock for the July meeting, or for the stalls in Bingley Hall or Baker Street; *that* is a different branch of the subject, which, however interesting or valuable in itself, hardly concerns nine out of every ten rent-paying farmers. "Master Butterfly" may have his pailful of milk morning and night until the days of calfhood are long gone by; or "Duchess 317th" may pull at the teats of her nurse till a pair of incisors push out the like number of milk-teeth; and still there will be no proof that such can ever be called a desirable general practice. The question before us is how to rear the best lot of calves, and the largest number of them, at the least expense.

And, as it is of no use to have the bird without a cage to put it in, so the first point to be attended to is to have the calf-house in decent order and of good construction. We do not say of the *best* construction, for the question has yet to be settled what that really is; and, even when that is done, the majority may be unable to avail themselves of the decision. Still, about most farm premises a spare hovel can be allotted, and, if need be, modified or amended, for this purpose. Believing, as we do, that calves are best tied up for the first couple of months, that they are more manageable in getting their milk from the pail, and that the least outlay is thus involved in house-room, we may simply describe the arrangement of such a building as is referred to. Take any convenient shed or house that comes to your hand; say, 18 feet × 15 feet, well lighted and aired, but without draughts, and the walls 7 feet high. Leaving one side unoccupied, as the fall of the brick floor (1 *inch to the yard*) should be from the other three sides, converging in that direction, where a grated cesspool should be ready for taking off the urine, you may divide the remaining walls into ten standings. These divisions need not be expensive. Wicker hurdles,* costing 1*s*. each, and measuring 5 feet × 3 feet, will answer every purpose. One end requires to be firmly secured to the wall, and the bottom fixed to the floor with a couple of holdfasts. Of course, in an arrangement such as the one spoken of, there is ample room for the display of any amount of taste or expense in fitting up, but we have named the cheapest plan which we have found fairly to answer the purpose. The hurdles have this advantage, that they are easily removeable, for getting the floors flushed and the walls cleaned and whitewashed. A small beam, 4 inches × 3 inches, runs along the wall at a height of 2½ feet from the floor, and into this the staples are driven, through which the halter-ropes are allowed to play. The small hods, or troughs, holding about 1½ gallon each, are likewise fixed immediately under it. At the height of 3½ feet is the hayrack; one of the common iron semicircular fashion is probably the cleanest and best, one answering for each pair of calves.

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* Flake-hurdles, or lamb-hurdles, as they are variously styled.

So much for the calf-house. But there is yet another point worthy of attention before coming to deal with the young animal itself. The health and condition of the cow before calving greatly influence subsequent results. A late-milked, lean, raking, ill-cared-for beast has oftentimes an easier parturition than those that are better furnished in these respects. But her after milking has a tale to tell of neglect somewhere; and the scraggy, "set" condition of the calf throughout its after course, often arises more from this cause than from any other. Hence, we would say, dry the cow a *fair time* before calving, and see that she has something better than barley-straw to live on, else the calf and its owner will assuredly lose by it. But what is regarded as a fair amount of time for being dry? If a cow brings her first calf when from two to three years old—which the majority probably do, though all will admit that it is too early—we should not care to milk her more than five or six months after calving. By this means she will grow and increase in size and value before her second calf. But a cow from the fourth to the eighth year, if in good condition, need not be dry more than six weeks or two months before calving; *i.e.* if fed with a thoroughly liberal hand throughout the year. If more sparingly fed, or if the cow exceeds the latter age, then we should prefer her being dry three months before calving. But, of course, there are exceptions to be met with, which cannot come under any general rule, such as the case of those animals whose flow of milk is so strong as to continue almost up to the time when the new lacteal secretion commences. It saves occasional trouble and annoyance, and is more satisfactory in every way, to have a clearly made out list of the dates of calving and other particulars hung up in the cowhouse, and accessible to the cowman as well as to the owner. The following form will meet the majority of cases:—

No.	Name	Age.	Breed.	No. in Private Herdbook.	Served by.	Will Calve
1	Strawberry ..	7	Short-horn	84	Sir Colin ..	January 21.
2	Myrtle	5	Ditto ..	106	Ditto ..	March 4.
3	Duchess ..	12	Ditto ..	29	Ditto ..	February 17.
4	Verbena ..	4	Cross	..	Vanguard	November 4.
5	Snowdrop ..	6	Alderney ..	..	Ditto ..	December 11.

A great deal has been said, by writers on the subject, about the season of the year when young calves should begin to arrive. No doubt it is better, as a general rule, to have the calves well forward and ready for early grass, by which means they are so strong as to require considerably less attention the following winter. But near a town, where a winter dairy is an object, or on the establishment of a nobleman or gentleman, where a supply of milk is as indispensable in winter as at any other time, the period of calving will, of course, be greatly modified; or, more correctly speaking, there will be a sort of duplicate calving-time, extending from October till June. And we know of no reason why good calves should not come under the same law which the Cheshire farmer laid down for the application of dung to the grass-land. "Put it on all the year round," said he; and we would say, "Rear calves whenever you have them;" *i.e.* if they are worth rearing. If you do not consider them worth rearing, better to sell them at once at a nominal price; even such an one as we met with in Renfrewshire last year, where a contract was made by a dairyman to deliver 100 bull-calves, at 6*s.* 9*d.* per head, the buyer removing them on the day of their birth. Not that we think taking the calf so early from the cow is by any means a humane practice; nor yet that we should prefer cutlets from *such* veal, although retailed by local butchers and grocers at the low rate of 2*d.* per lb. From the circumstance named, an Ayrshire steer is unknown.

We do not intend collating the pros and cons as to whether suckling from the cow, or feeding from the pail, is most desirable in the generality of cases. After a pretty full trial both ways (although our predilections were in favour of the former as most natural and most manageable), we have been forced to the belief that the latter is the preferable course for the farmer, and for the country at large. In the first place, you can, by an ample allowance, make quite as precocious a development, if *that* is the object, as by allowing the calf to suck the best cow that can be met with. Then you have the satisfaction of knowing exactly what quantity of milk is consumed, when you give a stated allowance from the pail. You can also the sooner reduce the quality of the rations, by addition or substitution of other food, so as to increase the number of the stock; and, in a general way, the calf learns the sooner to shift for itself. It is certainly a matter of occasional convenience to let a pair of calves run with a cow which is intended for a barrener, and, after weaning, then to fatten the nurse. But, if done as a general practice, it so far retards the bullings of the cows as to defeat the annual arrangement for a certain number of calves at a particular season. Where suckling from the cow is the rule, five calves may be moderately well brought up by an average cow; two and two in succession, and a single calf to finish off with.

But, under any circumstances, we consider it desirable to allow the calf to remain with its dam for the first three or four days after calving.* It is undoubtedly the most natural way, and there are several advantages connected with it. Youatt expresses himself very truthfully when he says, "It is a cruel thing to separate the mother from the young so soon; the cow will pine, and will be deprived of that medicine which nature designed for her, in that moisture which hangs about the calf, and even in the placenta itself; and the calf will lose that gentle friction and motion which helps to give it the immediate use of all its limbs, and which, in the language of Mr. Berry, 'increases the languid circulation of the blood, and produces a genial warmth in the half-exhausted and chilled little animal.'" He further says, and we are glad to quote from so high an authority, "In whatever manner the calf is afterwards to be reared, it should remain with the mother for a few days after it is dropped, and until the milk can be used in the dairy. The little animal will thus derive the benefit of the first milk, that to which nature has given an aperient property, in order that the black and glutinous fæces which had been accumulating in the intestines during the later months of the fœtal state might be carried off." Moreover, the cow's udder becomes more soft and pliant than it would otherwise be, by the calf being allowed to suck for a time. In the case of young cows especially—the udders of which are generally hard—it is often advisable to allow the calf to suck for a couple of weeks. The whole of the milk need not be consumed by the calf, but a portion drawn into the pail before it is allowed the teat. Thus a double purpose is served; the calf gets the richest (the last) of the milk, and the udder is softened the more by its efforts to obtain what it requires.

Not much trouble is generally experienced in getting the calf to take to the pail. We find it better to miss the evening's meal, and next morning a very little attention induces the majority of them to partake of what is set before them. At most, the guidance of the fingers may be wanted for the first meal or two.

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* This is questionable. See p. 147.—P. H. F.

As regards the quantity of milk which is needful to keep a moderately bred short-horn calf in a thriving condition, we have found the following allowance to come pretty near the mark, although the appetite of calves varies, both in individuals and at different times with the same animal:—

1st week with the dam; or 4 quarts per day, at two meals.
2nd to 4th week, 5 to 6 quarts per day, at two meals.
4th to 6th week, 6 to 7 quarts . ditto ditto.

And the quantity need not, during the ensuing six weeks (after which it is weaned), exceed a couple of gallons per day. This implies that the calf is fed upon new milk only, and that no other feeding *liquids* are employed. But, in addition to the above, the calf will, towards the fourth week, begin to eat a little green hay; and, in a week or two later, some sliced roots, or meal, or finely crushed cake, mixed with hay-chaff; and, if really good, creditable beasts are wanted—such as will realize 25*l.* a-head from the butcher when turned two and a half years old—a little cake or meal in their early days will be found a desirable investment. In fact, we doubt not but one pound of cake per day to the calf will make as much flesh as triple the quantity of cake at any period of after life. As regards meal, if that is given with the chaff, we prefer oatmeal, or barley-meal, or wheaten flour, but not the meal of beans or peas. Others may see it differently, but we believe beans to be too heating for any class of young stock. For roots, the best we know of is the carrot, grated and mixed with the chaff, or sliced thin with a knife and given alone. It is also, of all roots, the one which we find them most fond of, and which they will most readily take to. As soon as they can eat them freely, an immediate reduction in the supply of milk may be made.

In most articles it holds good in the end that "the best is the cheapest." So with the rearing of calves; the best class of food, or that above referred to, is found to give the greatest ultimate satisfaction. But practically the question often is, how to rear good calves with comparatively little new milk, a condition which circumstances often render almost imperative; for where dairy produce, in any other form, is the chief object, the calves stand in a secondary position, and are treated accordingly. But let us ask whether you cannot rear good stock under such circumstances also? We believe that this may be, and often is done. We manage to turn out from twenty-five to thirty calves annually—such as will pass muster anywhere—and never use at any one time more than six gallons of new milk daily. For this purpose, as well as to obtain a regular supply of milk for other purposes, the calves are allowed to come at different periods, extending from October to May. Hence the calf-house previously described has generally a succession of occupants throughout the season; and as one lot are ready to be removed, and placed loose in a small hovel, with yard attached, others fill their places. We begin with new milk from the pail, which is continued for a fortnight after leaving the cow. Then skim-milk—boiled, and allowed to cool to the natural warmth—is substituted to the extent of one-third of the allowance. In another week the new milk is reduced to half, and at the same time, *not before*, boiled linseed is added to the mess.* As soon as they take freely to this food, the new milk may be replaced with that from the dairy, and the calf is encouraged to indulge in a few sliced carrots and the other dry foods named. Among the multitude of substitutes for milk that have at different times been recommended, we have found nothing better than those previously referred to.† It is true we have omitted any allusion to the "Irish moss," which calves seem to relish well, though it does not prove of a fattening nature. For the lot of calves named, a couple of hundredweight of this article is found a desirable addition, and lasts throughout the season.

In rearing calves after this fashion, success greatly depends on attention to a few minute details. Not that a list of rations should be given for different sizes, ages, &c., but the attention, care, skill, and labour needed thus to make good calves, are far greater than when either suckling from the cow, or feeding with a liberal supply of new milk from the pail, is the system adopted. For instance, even in the matter of giving their food, a wide difference will be seen in the appearance of two calves, the one fed by a careful, painstaking hand, the other allowed to gulp down its milk without time for admixture with the saliva. This is a very important matter, and one on which success or failure very frequently depends. The nearer the process of feeding is approximated to the slow, but beneficial, act of sucking, the better. Those calves which are in the habit of drinking much too fast are generally detected by a glance at their "paunchy" condition. We have treated such customers successfully by putting on a small leather nose-bag at mealtimes, the bottom being perforated with a couple of holes, each $\frac{3}{16}$ths of an inch in diameter.

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* Five pounds of linseed will make about seven gallons of gruel, and suffice for five good-sized calves, considerable allowance must, however, be made for differences of quality in the linseed, that from India not being gelatinous enough, and therefore boiling hard, instead of "coming down kindly."

† A gentleman on the borders of Leicestershire, who has been in the habit of rearing largely, economically, and well, writes us that "he has tried many *substitutes* for milk, such as hay-tea, oilcake gruel, Irish moss, oatmeal, &c., but has come to the conclusion, after considerable experience, that nothing is so suitable as milk." Another gentleman, who is one of the most successful managers we know of, gives it as his experience, that "the best substitute is linseed and wheat ground to meal (2 bush. of linseed to 1 bush. of wheat), boiled to gruel of a moderate thickness, and then mixed with an equal quantity of skimmed milk.

Again, care must be taken to have the calf well bedded at least twice daily, wheat-straw, shortened, being the best litter for the purpose; attention to this point will tend, as much as anything, to keep the animal in good health. No vermin must be allowed to obtain a lodgment; how often is it the case that the entire welldoing of a calf is retarded from the presence of lice on the head or neck, the top of the shoulder, or towards the rump! If in a continual state of irritation, its thriving can scarcely be looked for. We are not aware that the appearance of these parasites is attributable to any peculiarity in management; Calves in good condition, calves in the highest condition, as well as those of a contrary character, are alike subject to them. A dressing of sour buttermilk, well brushed into the skin, is called for without delay, or the usual application of *stavesacre*, soda, and soft soap, if the former is ineffectual.

In the case of any other ailment that calfhood is liable to, we have found "Day's Gaseous Fluid" an amply sufficient resource. Since using it we have not lost a single calf, neither can we refer to a calf having had any attack of scouring which continued a couple of hours, nor to one instance of the succeeding meal being refused, however much may have been the loss of appetite previously.* *Probatum est.*

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* This complaint (diarrhœa) is one of the most troublesome with which the calf-breeder has to deal. Again and again inquiries are inserted in the agricultural papers asking information on the subject, and the replies are as varied as the queries are uniform. Take a recent case, from the columns of 'Bell's Weekly Messenger,' where "An Old Subscriber" says,—"I have adopted all the means veterinary skill can suggest, but with no good result. Some of my calves begin to scour when not more than 24 hours old, and some from a week to 10 days. They live wholly on new milk, always sucking from the cows. My cows have been living on hay cut into chaff, mixed with pulped mangold, at the rate of half a bushel per cow per day, and 2 lbs of oilcake and 2 lbs. of meal. The cows have had no grass till this day. I lose about half my calves from this scouring. Any information will be thankfully received." One reply recommends the inquirer to "see that the cow be well milked before he allows the calf to suck, giving it a tablespoonful of castor oil, in new milk taken from a cow that has been calved some time. The first milk is too rich for the calf. I formerly lost several calves from the same complaint, but never one since I adopted this plan." Another says, "Try a teacupful of rennet for the scour in calves, given just before they begin to suck, or a strong infusion of bramble-leaves. Dry the leaves in a cool oven, rub them down, and infuse for 15 minutes." And again:—"If 'An Old Subscriber' will give his calves that scour (according to age and strength of the animal) from one-third to one-half of one of Cupiss's Constitution Horse and Cattle Balls, broken sufficiently fine to be given in cold gruel or water, he will find the medicine a remedy, and otherwise beneficial. It may be repeated, if necessary. In hot weather it will be necessary to put the ball into cold water a few minutes, or it will not break for mixing." A fourth says:—"I should recom-

Castration is generally performed when the calf is from three to six weeks old. The former of these ages we consider pre-

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mend him not to let his calves have more than three pints of milk per day for the first four days, and not more than four pints until they are a month old. I wean from 30 to 40 every year, and never lose one from scouring. If they show the least symptom of scouring I always give Day's Gaseous Fluid, which is a certain cure if taken in time." While the next says, "If 'An Old Subscriber' will discontinue feeding his cows on the mangolds, and give his calves one tablespoonful of bruised grains of Paradise and one tablespoonful of starch simmered in a quart of new milk, and repeat it two or three times if necessary, I have no doubt the effect will be satisfactory." Another gentleman recommends food rather than medicine to be looked to:—"I would advise to double the quantity of cake and meal given to the cows, and withhold the mangold; on no occasion should this root be given to cows suckling young calves." "An Old Dairymaid," also, "who superintends the rearing of about 30 valuable calves yearly, seldom losing one of them, wishes to give 'An Old Subscriber' advice how to prevent scour in calves. As soon, then, as the calf is born she recommends about a pint or a pint and half of beastings from the dam to be given to it, by means of a smal horn, out of which the calf will usually suck it. All the remaining beastings which can be milked from the cow should be drawn from her, as she will naturally retain quite enough, and often more than sufficient, for the support of her offspring. As soon as the calf is strong enough to stand, it should be induced to suck, taking care that as small a quantity as possible be left in the bag. 'An Old Subscriber' should treat the animals the reverse of what he does, viz., the calves should not be allowed their fill of milk till they are at least a week old; but should scouring take place about the time named, which is not at all unusual even with this treatment, it will make them disinclined to move about and to seek for the teat, and they are, no doubt, often lost for the want of a little milk being given to them. If, however, the scouring continues, about three large tablespoonfuls of linseed-oil should be administered, and, if this does not have the desired effect, give milk from another cow, but by no means use drugs of any kind, as 'An Old Dairymaid' considers the best remedy is good nursing, and that want of proper attention to them while so very young is often the cause of scour in calves"

We may be excused adding to the length of this note by giving the reply which we penned in answer to the same inquiry:—

"Remedies for the above ailment are often local and empirical; it is far better to treat it constitutionally. In short, 'remove the cause, and the effect will cease.' But unfortunately several details are wanting from which to form a judgment, or make a profitable suggestion. Diarrhœa in calves may, and often does, arise from very diverse and frequently what may be called trivial causes; these causes, as operating on the little animal, are either external or internal. If the former, we should be disposed closely to examine the feeding of the cows, and to put a few queries respecting the same. For instance—Are the mangolds carefully cleaned? Adhering soil tends to scour the cows in a moderate degree, and of course the action is much more serious on the calf. It so happens that the complaint from which 'An Old Subscriber' suffers has this season been particularly prevalent, from the very fact indicated. The small mangold-roots of 1860 have been much more difficult to clean, and have consequently carried more soil with them to the feeding-troughs than in the average of seasons. Their use should cease entirely with those cows that are suckling, unless this has been already done.

"Again: Is the cake a genuine article? How has it affected the fatting beasts? Is there no irritant contained in it? And what kind of meal is referred to—that of barley or beans? We should very heartily urge the use of the latter in preference to the former for nursing cows.

"Again: Do the calves suck their own mothers? A mistake is often committed in putting a young calf to a cow which has been some months in milk. This should not be done before the calf is a fortnight old, and even then with much caution.

"As to external causes of diarrhœa, a close, ill-ventilated, dirty, or damp calfferable; it is at all times a safe practice to fast them at the time for the preceding meal.

As spring advances, the supply of roots to the calves will necessarily be greater, according to their increasing age and ability to masticate. But it is noways desirable or economical to send them out to grass very early in the season. Last year we saw, on many farms along the line of the Central and North-eastern Railways in Scotland, lots of puny, half-starved calves crouching on the lee-side of the fence, while the Grampians yet retained a full share of their wintry mantle, and the streams running seawards were flooded with the melting snow. This was in the early part of May, and we cannot profess to have fallen in love with the practice, though probably the unexampled scarcity of food in the north had something to do with it. Better far to spend a few pounds in artificial food, than to push the young stock out into the fields prematurely. And you will do well to *begin* by giving them only a few hours afield during the day, bringing them in again at night to their pound of cake, with a bit of (hay) chaff for the older ones, and the mess of skim-milk and linseed gruel for the younger stock.

If arrangements can be made for summer grazing the calves in a park, such as is usually found about a nobleman's place, they will do far better there than anywhere else. What with shelter, food, and water—the former alike from the biting blast, the scorching sun, and the tormenting flies; the latter not only to drink of, but to splash about in the running stream—we say there

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house may be reckoned the chief. The owner would do well to have the house carefully examined—wash it out, and then try the floor with a pocket-level. If the fall is less than an inch to the yard, the bricklayer must be had to remedy the defect. Calves void a large quantity of urine in proportion to their size, and ample provision must be made for carrying it off freely. Let them also be well littered down twice a-day with wheat-straw, the boltens cut through the middle, and the straw shaken up together. Encourage them to eat a little sweet green hay from a rack before them, and also a few sliced roots, as soon as they will take to them.

"But for immediate action, if the scourge still continues. Watch the premonitory symptoms, viz. feverishness and refusal of food. Remove the affected animal to a warm place, and tie a cloth over the body, which will tend to keep up the vital powers. Give a dose of 2 ozs. of castor oil, with half a teaspoonful of ground ginger, and a whisked egg. This will remove the offending or irritating matter; and then follow up with the free use of 'Day's Gaseous Fluid,' according to directions on the bottle. Or if castor oil is not at hand, give about 3 ozs. of common salt, in a little wheaten flour gruel. And if the bowels still continue relaxed, and the evacuations too watery, the calf must be drenched twice a-day with well-boiled and thickened wheaten gruel. But do not continue its use longer than is needful. It is well that nature be allowed to help herself a little. Before returning the animal to the calf-house, let the house be well flushed out, and washed down with water containing an ounce to the gallon of chloride of lime. This will remove any offensive taint or smell—a precaution very essential for the well-being of calves. In conclusion, be not persuaded to employ strong astringent medicines; and do not rest satisfied with rearing less than every calf which is in a sound healthy condition at birth."

is more in these old-fashioned matters than you may care to recognise. As Mr. Bowie, of Forfarshire, a noted breeder of polled cattle, remarked when we happened to see his young stock last summer, "That," said he, "is the life of them," pointing at the same time to the burn or brook which ran along the bottom of the field, and in which the calves were standing, and swishing their tails, under a broiling sunshine. Among calves reared in the manner we have named, blood-striking, or quarter-ill, is hardly known. We have only had one case out of 150 calves so treated, and that was attended by special circumstances, which readily accounted for the illness as exceptional. Not that we should advocate putting them into a park which is so filled with taken-in stock as to cause a risk of semi-starvation. Better in such a case to keep them at home, and graze them on a piece of old turf, or second year's "seeds," or something of the kind. But there are certainly many parks (or enclosures adjacent to them) where an arrangement of the kind could be readily made; and, even if not pretty close at hand, the facility of railway communication partially nullifies a distance of 20 or 30 miles.* Many of the west of Scotland farmers send their young stock, for summer keep, across the Clyde, to the green-topped hills beyond, wisely reckoning that their own grazings pay better in the shape of milk, butter, or cheese, for the teeming population near at hand. But, from a "penny wise and pound foolish" sort of policy, which forbids their bestowing more than the smallest modicum of care, attention, or expense upon their stock until they are of an age to enter the dairy, the summer seems to do but little for them.†

Kept thus, calves ought not to cost their owner much trouble or expense during the first summer of their existence; *i.e.*, when they have fairly said good-bye to the pail or the feeding trough. In October, however, they must not be forgotten, but according to the mildness or severity of the season either have their range prolonged, or be brought to the homestead. Receiving yard shelter at night, and a dry feed into the bargain, they may roam in any convenient pasture during the day. In another month the horns may be branded with an inch brand, and the numbers entered in the private herd-book. Every farmer who rears stock, of even the most moderate quality, ought to keep such a list. You have then, among other advantages, the opportunity of seeing which cow's calves are, or are not, worth keeping in the ensuing season. You know the exact age, the sire and dam, and other particulars, which are as important to the owner, as the entries of Mr. Strafford are to the higher breeders of pure stock.

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* This resource would be valuable and obvious but for the danger of chill and contagion at present incurred; whilst long delays before starting, perhaps in tainted pens, and rapid passage through the raw night-air, have to be encountered, owners of well-bred stock will probably prefer driving 20 or even 50 miles to railroad risks.—P. H. F.

† The summer grazing (6 months) of a 2 years-old heifer is charged 32*s*. 6*d*.; 1 year-old, 21*s*. 4*d*.; and calves in proportion.

Stoneleigh Abbey Farm, Kenilworth.

VIII.—*On the Rearing of Calves.* By Major S. McCLINTOCK.

THESE observations are offered to advocate the abandonment of the old system of rearing calves, for one which shall insure a quicker return, and therefore greater profit to the farmer—a change which the condition of our stock and meat markets, the state of our root-crops, the rising prices of dairy produce, and the sounder views of economy now prevailing, unite in enforcing.

Let us first cast a glance at what may be called the "old system," or that according to which calves are kept on *as little* as will maintain them alive, turned out by day in all weathers, indifferently housed at night, receiving a scanty supply of milk, and that perhaps skimmed, so that to the pasture the calf must then look for food all the day—the half of which is spent by the unfortunate and neglected animal standing gazing and shivering at a gate, in anxious expectation of the herdsman to drive him to his hovel. What is the appearance of this animal? Do not his lean, ridgy back, his bare points, staring coat, and distended belly, show his pitiable condition? And whence this last feature? When the calf, with a keen appetite, leaves the hovel, supposing he has the benefit of such cover, and proceeds to "blow himself out" with grass, like a half-starved Caffre revelling on the carcase of an eland, the result will in either case be a distended abdomen, showing clearly the imprudence of "the *large and seldom*" mode of feeding as compared with that of little and often.

The calf, of all the animals on which the farmer is dependent, certainly fares the worst, and to him "fair play" is too often unknown. Yet, however great the value of milk may be to man for other objects, it must surely be unwise to rob the calf as much as is frequently done; let him not be denied pure good milk for a time, and only as he gains strength let other food be substituted.

As soon as the calf is dropped nature prompts the cow to lick her offspring, and I am disposed to allow her to do so, feeling satisfied it is a vivifying process, very beneficial to the calf, and under which it seems to be really at times endued with life itself, besides cleansing the skin from the viscous matter by which it is overspread; the mother also is benefited by this operation, obtaining thus a medicine suited to her present situation—one which nature designed for her.

I am aware it is sometimes the practice to take the calf at once from the cow, in order to prevent her from knowing and becoming attached to it, and thereby guarding her against fretting, which would not only interfere with her proper yield of milk, but aggravate the fever which already pervades the system; in this case it becomes necessary to rub the calf with cloths and wisps until it is dry and clean. It may indeed in certain cases be desirable to remove the calf at once, as some cows, and especially those with their first calf, plainly show an inclination to injure it. But, as a rule, it is better to allow the cow to lick the calf, and so much importance do some breeders attach to this operation, that, when the mother shows a disinclination to perform the office, salt and meal are sprinkled on the body to tempt her to so.

Supposing the operation of licking or rubbing to have been duly performed, the calf should be left quiet for some time in a place by itself, and beyond the mother's hearing, when she will very soon forget it, as it is doubtless desirable that she should do.

The following reasons may briefly be assigned for giving the preference to rearing by hand rather than allowing the calf to "run" with the mother, in spite of the advantages which the natural process has in promoting the secretion of saliva, and thus aiding the organs of digestion. When a cow is allowed to suckle her calf, she will not give her milk to the hand during the time the calf is "on her," and seldom *so kindly* ever after; neither, when he is removed after a few weeks, will she readily suffer a nursling to be foisted on her. If the cow falls ill it will then be too late to endeavour to substitute the pail for the mother, and in all probability the calf, if reared at all, will prove an unthrifty, unpaying animal; again, if a cow bring up two calves at once, the fastest sucker will have an undue share of the milk; lastly, rearing by hand is the most economical method as guarding against all irregularity or failure in the supply of food, which may be regulated to suit the object in view—diluted, mixed, increased, or decreased, according to the age of the animal, so as both to promote growth and make the process of weaning almost unfelt.

The cow herself should never be hurried or overdriven, as any increase in the ordinary respiration produces a heat in the milk which takes from its excellence. Respiration is a species of combustion; at every breath we inhale oxygen from the atmosphere, which unites with and consumes the fatty matter in the food. Cows when overdriven or worried breathe more frequently, inhale more oxygen, and consequently more of the buttery portion of their food is consumed, leaving less to impart richness to the milk. On this account, in very hot weather, it is well to house cows by day, thus relieving them from the irritating attacks of flies, and to turn them out at night; on the other hand, it is well known to experienced dairymen that their cows yield more milk in warm, pleasant weather when they have the run of a sheltered pasture, than on a bleak field in cold, rainy days—a difference which the same theory of respiration equally accounts for.

The old, and I trust almost exploded, system of giving medicine to the calf, in order to cause it to expel the first glutinous fæces (or meconium), is so contrary to nature that it must be censured. The delicate intestines of a newly-born calf are not prepared for castor-oil or spirits. Let its own mother's first milk, colostrum, or beistyn, be given two or three hours after birth; it is nature's medicine, unfit for human use, but prepared with a wisdom beyond ours to meet the requirements of the newly-born calf. This "colostrum" appears at every delivery, and from its peculiar nature produces a purgative action, and causes the "meconium" to be voided, which, for some time before birth, has been forming in the intestines of the calf.

We have heard of an egg-shell filled with spirits being put down the unfortunate animal's throat—the spirits to invigorate, and the egg-shell to clear the way and lubricate the passage to the stomach. Some give the egg, yolk, white, shell and all; and in Ireland, that panacea of all Hibernian woes—whisky—is thought to be the "elixir of life" for calves, though it must be said that the sister kingdom of England has its breeders, and some of celebrity, who do not fail to administer the glass of spirits in every case where a calf is born.

By thus early overtaxing the stomach and thwarting nature in its well-ordered course, the seeds of delicacy are surely sown. Medicine should not be tolerated until there is actual cause for its use, and then let it be administered by some one who can not only judge of the disease, but suggest a remedy to meet it. I hold it to be a great mistake to overload the stomach of a newly-dropped calf; so I consider the "beistyn" should be given in small quantities at a time, and, in the case of a healthy calf, not until it has strength to stand, as it is clear it could not suck its mother until it had so far progressed.

Should any apprehension be felt respecting the inactivity of a calf's bowels, or tardiness in expulsion of the meconium, the simple mode of inserting a piece of common soap, from two to three inches in length by half an inch in diameter, in the anus, and then rubbing the part briskly with the hand, in nine cases out of ten will cause a proper evacuation. I have so very often seen this plain and harmless treatment successfully applied, that I invariably adopt it, and with the greatest confidence recommend it from its simplicity and efficacy.

The colostrum, or beistyn, more commonly called "beastings," sometimes continues so long as to be of serious injury to the calf, but this is chiefly caused by feeding the cow too highly after calving.

The milk given to the calf should not be suffered to become cold, and by the assistance of the herdsman's fingers (which the calf will eagerly suck) as much may be taken up as required. Some calves will learn to suck by the aid of the fingers in a day. The palm of the hand is placed over the nose, with the fore-arm against the face; the middle finger is inserted in the mouth of the calf, while the other fingers retain the head in the proper position. With the other hand the vessel is held, which at first should be somewhat raised, and not allowed to rest on the ground —that being an unnatural position, and different from the one the calf would be in if allowed to suck its mother. In this we shall be only adopting in the calf-house the same amendment which has already made its way into the stable, where the hay-rack is no longer fixed in a manner rather suited to the giraffe than the grass-cropping horse.

The milk should at first be given in small quantities, say three pints every four or five hours, till the calf gain strength, when it may be increased gradually to as many quarts. Of this increase the herdsman alone can be the judge—a practised eye at a glance sees anything wrong. There is no animal in which disease is more easily detected than the calf. In health he sleeps quietly or is full of play; in sickness he is dull, and from the action of the flanks, distaste for food, sharp champing of the teeth, cough, or other symptoms, it is clear he is *amiss.*

There is considerable danger to calves from taking up straws and swallowing them before their powers of digestion are able to master such food. I have seen valuable animals lost by this, and, on being examined after death, a mass of undigested straw has been found incarcerated in the stomach. In order to guard against such occurrences, a muzzle should be kept on the calf until after it has been perceived to "chew the cud." The muzzle may be made of wire or leather, simply cup-shaped, with a band sewn at each side to buckle behind the ears. It is usual for the calf to begin to chew the cud in ten days, when the muzzle may be removed.

Much injury has been caused to calves housed together, from sucking each other, as they frequently take hold of the navel-string, a part of great delicacy in a newly-dropped calf.

The passage of the urine is also very important. I have seen calves appearing heavy and dull, lying down and panting, and to an observing eye evidently "wrong." The herdsman satisfies himself that the bowels are regular, but he cannot be so sure of the urine. I have observed him get the calf up, stand immediately behind it, and rub its sides vigorously with both hands at the same time, then gently manipulate the sheath, when presently the water flows copiously, and the animal is at once relieved. Now here are cases which perhaps, were they neglected, might become formidable and require the drenches of the cow-leech, and they are combated most successfully by the simplest means.

It is important that the calf should be fed from the milk of the same cow daily; a very little attention will ensure this, if the cows are milked and the calves fed in the same order. Any sudden change of food is injurious, as the least sourness in the stomach causes "scour"—one of the worst evils calves are liable to. On first observing it, a diminution in the quantity of milk may check the disease, which not unfrequently arises from the stomach being overtaxed.

In rearing calves our object must be to combine efficiency with economy, and to realise profit from the dairy without robbing or stinting the calf. We follow nature for a while, but are forced into another course ere long. We begin with pure "mother's milk," but in a fortnight a change must come. Milk is too valuable to be continued in its pure and neat condition, and a slight, very slight, change is introduced, consisting in the substitution of oil-cake gruel for a portion of the milk. This gruel is prepared in the following proportion,—one quart of cake (ground fine) to four of water. This pulverised cake is put into a bucket, and the water, boiling, poured on it. It is allowed to stand about eight hours, being occasionally stirred. My practice is to begin, when the calf is about a fortnight old, to add a very little of the gruel to the milk, and to increase the quantity by slow degrees, with a decreasing allowance of milk, until at weaning time the former has gradually taken the place of the latter. But when a large quantity of gruel is given, its potency must be lessened to guard against purging; and it will be desirable to add to every two quarts of the gruel as above mentioned one quart of water.

In employing an artificial substitute for milk, the following principles should guide our choice:—

1st. The nearer we are to nature the better, and the food which most resembles milk must be the best for calves.

2ndly. Care must be taken that the food be not too rich for the young animal.

3rdly. Growth and development of the frame must be provided for, to which end the food should contain an ample supply of phosphates.

Oilcake gruel seems to fulfil these conditions, being less rich, and containing a larger percentage in phosphates, than the pure linseed. We learn, it is true, from Mr. Cuthbert Johnston's excellent book, 'The Modern Dairy and Cow Keeper,' that "the only kind of food in which casein exists is that derived from leguminous plants, such as beans, peas, and lentils. When bean-flour is softened and ground up with water, and the infusion passed through a sieve, the water is found to contain casein, fat (butter), and starch. The latter deposits by standing, and the infusion has now all the character of skimmed milk, as in fact, with the exception of sugar of milk and butter, it is precisely identical with it. The addition of some fatty and gummy matter (as an infusion of linseed-cake) would more nearly approximate it to the composition of ordinary milk; and it is well worthy of remark that in several districts in England, and in many of Scotland, pea or bean soup is very frequently given to young calves."

In spite of this resemblance between milk and bean or pea soup, I confess to giving a preference to oilcake, partly because I have no trouble in procuring it, whereas in some seasons I have failed altogether in securing a supply of beans or peas, from the uncertainty of those crops in my neighbourhood.

Though doubtless much may be learned from the practice of owners of shorthorns who exhibit at our agricultural shows, I fear we should bid adieu to profit if we adopted their mode of calf-feeding. I am satisfied no yearling calf is put into a show-yard for competition at a less cost than 20*l*. The fat must be put on "regardless of expense;" a lean calf has not a chance of gaining a premium; and though I cannot defend the system of "fat at any price," still, judges must not be condemned who pass over a lean animal with a good shape. Early maturity and great thrift are characteristics of true shorthorns; and I must confess I should suspect delicacy when I did not at a show see ripe condition.

A good feeder is invaluable to an exhibitor: the ignorant herdsman thinks *quantity* is the object; the judicious feeder is ever on the watch, adopting the "little and often system," changing the food by degrees, and correcting any loosening effect which one kind of substance may have by the substitution of another. He never puts an animal up that is lying, as he knows it is "doing" as much when at perfect rest as if it had its head in a bucket of milk; quietness and gentleness follow all his movements, and the animals remain in that peaceful, placid state, so conducive to their well-being. They know "the times and seasons" as well as he does, and with astonishing punctuality rise and expect their feed; and the herdsman is careful not to be behind time, knowing well that "fretting causes wasting," and, if the calves are suffered to bellow and moan for their meals, the meat will not be "put up" as rapidly as it ought. This part of the system might well be more generally adopted, for kindness, quiet, and regularity cost nothing.

No doubt some owners of shorthorns make this mode of feeding pay, particularly those who have tribes of cattle of undoubted purity of blood and fashion, and have won themselves names as breeders; but to the ordinary amateur it is an unprofitable amusement, expensive and disappointing.

It is very difficult to lay down an exact rule for feeding calves, as far as quantity is concerned; nor can a time be fixed for weaning; the appearance of forwardness in the animals being the best rule to go by. However, as a general mode, supposing a calf to be dropped in March, I would suggest that pure "mother's milk" should be given for a fortnight, then by degrees an admixture of the oilcake-gruel introduced, and a sufficient drink allowed at each meal, so as to remove all hollowness from the flank. In a few weeks six gallons will be taken by the calf, and when the weather is favourable it should be allowed to run in some well-sheltered place where the pasture is sweet. In three months calves have an appetite for grass, and it is then that the process of weaning should be begun. I never use skimmed milk; and I gather from the experience I have had in rearing calves, that pure milk and the oilcake-gruel is the most wholesome as well as the most profitable mixture for calves. Water-gruel, hay-tea, and linseed-jelly, may be all used, and calves weaned on them; but the condition of those fed on the cake-gruel and pure milk will well bear comparison with the others.

I would have the calves fed with milk and gruel at 6 o'clock in the morning, or as soon after the cows are milked as possible. Then supposing them to have arrived at an age to be allowed to run at pasture, I would defer their being driven out until an hour or so after their first feed, so as to allow the process of digestion to be somewhat advanced, as when healthy calves are turned out they usually run and play about at first, which is by no means desirable immediately after being fed. Again, between 5 and 6 o'clock in the evening, I would allow each the same quantity as they had in the morning.

The calf-houses should be well supplied with rock-salt; there can be no second opinion as to its being a natural stimulus to the digestive organs, increasing the appetite and promoting the general health. We are informed by hunters of the attraction possessed by salt-springs for wild animals; nature doubtless prompting them to resort where salt is to be procured to correct the influences of unwholesome matter. Chalk is frequently used as a preventive to purging, and may, with advantage, be placed where the calves have access to it. It is, besides, an excellent ingredient in all drinks given in diarrhœa or scouring. The tendency to purging is caused by acid, which the alkali mixing with it neutralizes, and so checks disease. The animal suffering from inconvenience is led to seek some corrective or palliative, and, though seeming at times to pick up food unsuited to it, it is in fact having recourse to simples placed within its reach. We observe dogs eating grass, pigs rejoicing in cinders, and cattle regaling themselves on grass with clay adhering to the roots; nay, more, the cow has often been seen to pick up earth and eat it, particularly when any indigestion is present; and in the account of the Wonderful Kintore Ox, given in Mr. Youatt's excellent work on the breeds, management, and diseases of cattle, we find "He had a lump of rock-salt in his manger, of which he was particularly fond. A basket of earth also stood by him, of which he occasionally ate a considerable quantity, and which operated as a gentle purgative. The uneasiness caused by commencing decomposition caused him to have recourse to the mould, and the acid being met by the alkali was rendered harmless." I may here observe, that, for the sake of allowing the cattle the corrective of the earth, I object to washing turnips; the small quantity of mould adhering to them being more advantageous than the contrary.

The practice of placing setons in the dewlap I consider an excellent one, and the more the animal is forced or pampered the more necessary it is. I have never had a case of quarter-ill or blackleg, and am disposed to think the exemption from that disease may be chiefly owing to the use of setons. In January or February I usually have them inserted, passing them through the loose skin of the chest, taking care not to place them too low down, which would cause the animal much inconvenience when lying, as great soreness is felt for some days. The hair of a cow's tail twisted to the thickness of the finger, with a wooden button at one end and a knot at the other, answers the purpose. The seton should be smeared with Venice turpentine, to cause it to act quickly, and drawn from knot to button, or the reverse, daily. Black hellebore is sometimes used as a seton, and it may not be out of place to quote Mr. Youatt's valuable opinions, when writing on this subject:—"The use of setons in practice on the diseases of cattle is in a manner limited to the passing of a piece of hair, rope, or of black hellebore-root through the dewlap; and as exciting inflammation in the neighbourhood of the diseased part, and thus lessening the original one, and causing a determination of blood to a greater or less extent to this new seat of irritation, they are useful both in acute and chronic inflammation of the respiratory organs. In young cattle rapidly thriving, and placed in pasture perhaps a little too luxuriant, permanent setons are highly beneficial; they act as a salutary drain, and prevent that accumulation of the circulating fluid which is the usual cause of inflammatory fever and other fatal complaints."

In conclusion, a few hints may be given for the treatment of navel-ill, diarrhœa, hoose or catarrh, and blackquarter, in their incipient stages, although all serious cases involving the necessity of operations or really scientific treatment call for the presence of the veterinary surgeon.

The examination of the navel-string of the newly-dropped calf demands the first attention of the herdsman, who should not be satisfied if it present too raw an appearance, or blood be dropping from it. Mr. Youatt advises "a ligature should be passed close round it, but, if it can be avoided, not close to the belly. Possibly the spot at which the division of the cord took place may be more than usually sore. A pledget of tow, well wetted with Friar's balsam, should be placed over it, confined with a bandage, and changed morning and night; but *the caustic applications that are so frequently resorted to should be avoided.* Fomentation in the part, in order to disperse the tumour, the opening of it with a lancet if it evidently *points*, and the administration of two or three ounce doses of castor oil, made into an emulsion by means of an egg, will constitute the first treatment; but if, when the inflammation abates, extreme weakness should come on, as is too often the case, gentian and laudanum, with perhaps a small quantity of port wine, should be administered."

Next, *Scouring.*—So long as we observe the calf to be lively and playful, taking its milk freely, we need not be alarmed by thin evacuations. Most practitioners recommend a mild purgative in the first instance to remove the acidity and irritation of the bowels, after which the simple doses of from ½ oz. to ¾ oz. of tincture of rhubarb with an equal quantity of water.

Calves well housed until at least two months old, and not put to grass at too early an age, are seldom liable to scour which can cause any uneasiness. My custom, on an appearance of laxness, is to reduce the allowance of milk and keep the calf warm and quiet. An astringent drink of starch 2 ozs., 1 drachm of laudanum, 1½ drachm of ginger, is also recommended. Should it assume a threatening appearance, or the evacuations be white and tinged with blood, 5 grains of sulphate of copper and two of opium, given four times a day, will be found an excellent remedy.

Mr. Francis Clater treats this disease very simply, and his valuable book, 'Every Man his own Cattle Doctor,' is much prized, and should be in the hands of all stock-masters, as it is written in a style quite free from pedantry and professional technicalities.

I have found the acrid nature of the fæces to cause great irritation and uneasiness about the anus; this is greatly relieved by sponging with warm water and keeping the parts clean; too much care cannot be taken, after a cure has been made, so to regulate the diet as to guard against a new attack.

Hoose or Catarrh.—This disease, to which calves are very liable, is most dangerous when neglected, and runs its course with them even quicker than with grown cattle; it also suggests a special reason for vigilance, because it occasionally becomes an epidemic. It is very prevalent in early spring and in the "fall," owing, doubtless, to the extremes of temperature experienced at those seasons of the year. Even temperature in the houses, proper ventilation, nourishing food, and a fair share of it, are the best preventives; whereas, where there is cold, wet, and insufficiency of provender, the disease is almost sure to be present. The first time the herdsman hears a beast cough he should stop and examine it closely; the neglect may prove fatal to the animal affected. Mr. Youatt's advice cannot be too often repeated:—"There is no disease of a chronic nature by which cattle are so seriously injured, or which is eventually so fatal to them, as hoose; yet not one herdsman in twenty, and very few of those whose interest is more at stake, pay the slightest attention to it. The cow may cough on from week to week, and no one takes notice of it, until the quantity of milk is seriously decreasing, or she is rapidly losing flesh, and then medical treatment is generally unavailing. The disease has now reached the chest, the lungs are seriously affected, and the foundation is laid for confirmed consumption." And, again, how plainly and simply does he point out the means of ascertaining the exact condition of the animal, so that proper measures may be adopted for its relief! "Let her be taken up and examined. Does she feed as well as ever? Does the dew stand upon her muzzle? Are her flanks perfectly quiet? Then one or two nights' housing, and a mash or two, or a dose of physic, may set all right. But if, on examination, the muzzle is a little dry, and the root of the horn hot, and she heaves (although not much) at the flanks, and the coat is not so sleek as usual, and she is a little off her feed, let her be bled. Experience will teach the farmer that these chest affections in cattle often and speedily assume a highly inflammable character, and that they must be conquered at first or not at all."

I have often found in the first stage of common catarrh or cold a little nitre given at night in a bran mash have an excellent effect. This nitre, or nitrate of potash, is very useful and effective in allaying inflammatory symptoms; it also acts mildly on the kidneys. Two drachms in a little bran would be sufficient for an ordinary calf. It will be found to act on the skin, opening the pores, and inducing perspiration. So, while an animal is under its influence, great care must be taken to guard against sudden chills, and, by careful housing, to assist the medicine in its operation. If the cough should not yield to a few doses of this simple kind, we must add tartar emetic and digitalis, both most valuable medicines in cases where fever is present. A most severe case of inflammation in a heifer of mine was a short time since most successfully combated by the administration of frequent but small doses of these medicines, without having recourse to bleeding.

There are few things so annoying to cattle as lice. By their attacks the skin is kept in such a constant state of irritation that the animal can neither feed nor rest in peace, and it is hopeless to expect improvement and thrift while these pests remain in the hair. A thoroughly healthy beast will seldom be infested with lice unless near cattle that are so affected. A good state of health seems to repel, as much as a poverty-stricken beast would attract them. Unless checked they increase very rapidly, and whoever it was who said "they are grandfathers in twenty-four hours after their birth," seemed to have formed a tolerably correct opinion of their powers of increase. Powders may be recommended for their destruction, but an oleaginous application will be found the surest. Mercurial ointment would destroy them at once, but I hesitate to advise its use, fearing salivation. Strong tobacco-water, or sheep-dressing, will doubtless cause much relief, but I question whether they will be as effectual as train or linseed oil. After its application, and when the lice are found dead in the hair, a washing of soap and water will serve much to cleanse the skin from scurf and irritation, and prove very agreeable to the animal.

Quarter-ill, *Black-quarter*, *Joint-murrain*, *&c.*—No disease has so many names. This may be accounted for from the variety of the symptoms which present themselves. Inflammatory fever would better describe the malady.

It is not the calf alone that is liable to its dread attacks, cattle of all ages may be smitten with it, and it is more frequently present where there is high condition and much thrift. So sudden are its visitations, that we may to-day see a beast drooping and quite amiss, that we thought in perfect health yesterday. The heated breath, heaving flank, dry muzzle, quick pulse, and anxious looks, indicate the fever that rages within. The animal objects to move about, and when the posture is changed the gait is unsteady, principally in the hind quarters; there is also peculiar moaning, and laborious breathing. The uneasiness increases, he is constantly up and down, at last seems unconscious of surrounding objects. His efforts to rise prove abortive, the symptoms get worse, and the beast dies. The worst signs are a tenderness in the back and loins, with swelling in these parts, and yielding to the least touch; then we must fear that decomposition has begun; one of the limbs becomes swollen, and feels inflamed and tender, and shows no elasticity on being pressed by the finger: it is, in fact, in a state of mortification. Ulcers may appear in different parts of the body, particularly in the mouth, and the urine is discoloured, being darker, and perhaps bloody. To treat this disease, in the first instance the animal must be housed, and (much as I object to it in the general treatment of cattle) bleeding must be resorted to; purging with Epsom salts should follow: if one dose does not operate it must be repeated. The beast should be most closely watched during this treatment, the least change being carefully noted by the attendant. If there is improvement, doses of digitalis, tartar emetic, and nitre should be administered two or three times a day. Any swellings of the joints should be well fomented with hot water, and rubbed with equal parts of camphorated spirits of wine, spirit of hartshorn, and turpentine. Chloride of lime is a most valuable disinfectant, and it would be wise to wash all ulcers that may appear with a solution of it several times in the day; it will serve, in a great measure, to prevent the bad smell which always arises from the ulcers. A solution of chloride of lime of a quarter of an ounce in weight may be mixed with a pint of water, and will form a most valuable disinfectant lotion.

"Prevention is better than cure," and I am disposed to attribute my immunity from loss by quarter-ill to proper attention to feeding and housing, and also to the use of the seton, which it is my practice to insert in the calf's dewlap towards the end of January. The oilcake, which I strongly commend, causes the bowels to be kept in a regular state.

Before I conclude I must impress on young farmers the great advantage of having their stock-houses properly constructed, so that there should be no lack of light or fresh air; both are essential to the well-being of calves. I am rather an advocate for the light being admitted from the roof, or at all events sufficiently high to prevent the animals standing "at gaze," and, by much watching, becoming unsettled and unthrifty. The houses should be kept scrupulously clean, no accumulation of dung or wet litter allowed to remain, and the floors thoroughly swept before fresh straw is supplied. I find wood answers admirably as a floor; it is more easily kept clean than ordinary pavement. If good paving stones are scarce, the thinnings from young plantations, cut into blocks about ten inches long, and placed vertically on a bed of sand, will be found an excellent substitute. I prefer the wood to the stone, and both to flagging, which is at times dangerous, owing to the smoothness its surface presents from wear and wet.

While animals are feeding, their houses should be cleaned rather than at any other time, and then also their coats should be brushed, as they will like to lie down and rest when their food is disposed of. The gases arising from decomposed vegetable matter are injurious to cattle; and if so to adults, must they not be much more so to animals of tender age? In severe weather warmth, and at the same time proper ventilation, should be provided: the importance of these requisites cannot be overrated.

In conclusion, I may remark that I have treated of the rearing of calves with the aim of turning them into money with all convenient speed, whether in the shape of well-bred cows for breeding and the dairy, or of fine steers ready for the slaughter-house. Of veal calves I have said nothing, not considering that they come within the limits of an 'Essay on Rearing Calves.' They are not, in fact, *reared*, as it takes but a very short period of time to prepare them for their purpose. It behoves the rearer of calves to "look sharp;" for mortality amongst them tells fearfully against his pocket. The death of one or two in the year, and even delicacy and the absence of thrift, would swallow up a considerable amount of any profit a breeder (on an average scale) might reasonably expect from his young stock, because he must always allow a margin for casualties in the byre previous to birth ("there is many a slip between the cup and the lip"), and the would-be rearer is often disappointed by cows aborting, or unfortunately producing dead calves, events over which he cannot have much control; to which, however, I am disposed to think high feeding largely conduces. When he has his calves safe and sound, I do not feel that I presume too much when I say that, by strictly following the advice which experience has enabled me to give with confidence in the foregoing pages, he may look for a fair share of success in his certainly somewhat arduous undertaking. "It is not in mortals to *command* success." Let us, however, endeavour to deserve it.

Randal's Town.

IX.—*On Improvements in Agriculture in the County of Nottingham since the Year* 1800. By JOHN PARKINSON.

THE period of the last sixty years has been one of great and increasing outlay by owners and occupiers of land in the county of Nottingham. Most of the proprietors have expended large sums on buildings required either by the increase of feeding-stock consequent on improved cultivation, or in rebuilding farmhouses and cottages, of which the latter are generally in a better state than those of most parts of the United Kingdom. Much land has been effectually underdrained, the owners in some cases having paid the whole expense (excepting for team-work) and charged the occupiers a percentage on the outlay. In other instances tiles have been paid for by owners, and all other expenses by the tenant. But little effective and permanent underdraining was done in this county previous to the present century.

The first great improvement was the adoption of Elkington's system of cutting deep drains to intercept the springs, and tapping the lower springs by boring with an auger, which in numerous instances has been very efficient. The former mode of using thorns and turf in making shallow drains has been gradually superseded, first by the use of elliptical tiles and flat tiles for soles on loose subsoil, and since by pipe-tiles and collars where the bottom of the drains is not quite firm; but in numerous instances the drains were made too shallow, and many tiles have been taken up and relaid at greater depth. The making of all under-drains of a uniform depth of 4 feet, and of the distance from each other of from 6 to 20 or more feet, according to the nature of the subsoil, and using pipe-tiles and collars, has been strongly recommended for the improvement of all lands which are injured by superfluity of moisture, and in numerous instances this system is found effective.

It may, however, be proved that such uniform system is not in many cases fully efficient; as if, by using an auger between the lines of drains so made, water can be raised to within 2 feet of the surface of the ground, and remain at the same height for a considerable time, the drainage of the land cannot be deemed perfect, in which case the system of Elkington should be adopted to complete the improvement; but the most advisable and effective mode, where by using an auger deep water can be raised nearly to the surface, is in the first instance to have holes dug in several parts of the land so deep as to contain water, and then have deep drains made in the proper direction for intercepting upper springs, and likewise by boring to raise the water from lower springs. By such means, if the water be freely drawn from the various holes which have been dug, the drainage is complete; otherwise it is requisite that parallel drains of the depth of 3 or 4 feet should be made at such distances as will effectually draw the water from the holes: and where, by the foregoing test, drains of the depth of 3 feet are proved to be effectual, it would be a useless expense to have them made deeper. The theory of Elkington is imperfect; but he led the way to great improvements by the raising of water from deep springs and intercepting water from higher springs, and was well entitled to the reward he received.

Great improvement has been effected in the mode of making and keeping in repair the roads in this county, and most of the public and many of the occupation roads are now in a good state. Before the present century very rough materials were generally used, and they were frequently laid in a trough. It is now the practice to have materials, small or well broken, laid on a surface inclining about an inch in each yard from the centre, and the materials kept together by loose earth on each side; but wherever the surface of a road is tender, complete under-draining should be effected before the materials are laid thereon. Soft stone may be used with advantage if covered immediately with small broken hard stone or gravel; and in repairing roads small materials should always be spread over the surface after it is levelled, and not laid along ruts. It is important that the sides of the road should always be lower than the surface of the materials.

The open drains and gates are greatly improved, and upon numerous farms the fences of whitethorn quickset are kept in admirable order from being cut after harvest yearly, so as to be very narrow along the top.

The greatest improvements in the county within the present century were made by the late Duke of Portland, who brought into regular cultivation and farmed extensive tracts of land, some of which had been previously let at 2*s.* an acre, and a considerable part as rabbit-warren and sheep-walk at a nominal rent, which lands have been highly cultivated according to the most approved system of drill-husbandry. Much unproductive land has also been converted into excellent watered meadow by diverting the river Maun into carrier drains.

A great portion of the remaining part of the forest of Sherwood has been enclosed and now grows abundant crops, and many sheep of an improved breed are now reared and fed thereon.

A considerable quantity of oak timber has been grubbed up on clay-land in Epperstone, Ossington, Norwell, and Winkburn, which now produces abundant crops; and many plantations of larch in Blidworth and elsewhere have been converted into fertile arable land. The owners of the very poorest sandy and gravelly land, who planted larch thereon more than sixty years ago, derived great benefit from the produce; and where the ground has been cleared the land has become so fertilized by the vegetable matter derived from the larch as to be worth more than double its former value and to produce good corn and green crops, although formerly it would not repay the expenses of cultivation. The best and most profitable mode of treatment of such soils is to fallow, use artificial manure, and take a crop of turnips to be eaten off by sheep, and then trench, dig, or double-plough the land and plant it with larch, which, after such preparation, grow rapidly, and the thinnings soon repay part of the expense; the trees attain a good size in much less time than when they have been planted in holes without stirring the rest of the surface. Although such method is expensive at the commencement, it is more economical and profitable than the common mode of proceeding, by which considerably more plants and much more time are required before a plantation is in a thriving state.

A short time previous to the present century an act of parliament was obtained for the embankment and drainage of an extensive tract of land at the northern extremity of the county, which had been covered with water yearly in winter, and two subsequent acts have been found necessary to authorise the completion of the works. Two powerful steam-engines are erected, and the land has become valuable and productive.

The banks of the Trent and Devon have been made effective for the prevention of summer floods in many parishes. A considerable district adjoining the river Idle, between Retford and the Trent, might be very materially improved by drainage and embankment.

With reference to the cultivation of lands whereon turnips may be advantageously eaten by sheep: about the year 1800 there were several recent improvers of light sandy land, in the district between Retford, Worksop, and Bawtry, who had adopted a regular course of cultivation; but autumnal cultivation for fallow was not then practised, and corn and turnips were chiefly sown broadcast. Swede turnips were not then grown, and all spring corn was harvested in a loose state. In most other parts of the county, and especially on the best sandy and light loamy land, cultivation was at the above period extremely defective; the land being not well cleaned, turnips were sown broadcast and too late, and the crops generally abounded with couch and annual weeds. There has, however, been gradual improvement, and occupiers of light lands in every part of the county now adopt autumn-cultivation and all other modern improvements to grow turnips, whilst the increased number of their sheep and cattle, fed to much earlier maturity than formerly, bespeak them a foremost place among the farmers of the United Kingdom.

In respect to the arable lands of strong loam and heavy soils, drainage has produced wonderful changes, and some of the fields which were deemed quite unfit to grow swede turnips now produce the heaviest crops, the land being previously well cleaned by autumnal and early spring cultivation. If care be taken that the land is in a dry state when ploughed for the succeeding crop, that and the subsequent crops of clover, grass seeds, and corn are usually more abundant and profitable than after the naked fallow, which is gradually diminishing, except in exceptional wet seasons like the last: even if the land cannot be prepared for mangold or turnips, tares or mustard may be substituted with advantage.

A practice exists in this county which is productive of much good to the labourers. Upon many of the larger farms a large-sized cottage is provided for the head servant, who is a superior married farming-man, and receives the house and garden rent-free, undertaking to lodge and board the unmarried workmen. The wages of such a foreman are from 25*l.* to 30*l.* a year, and he is allowed 1*s.* a day for the board of each man, with stated quantities of milk and fuel and ten stones of well-fed large pork and two bushels of malt for himself and each servant yearly, and candles for the stables and cow and feeding houses. The yearly wages for men and strong youths boarded either in the farm-house or by the head man are from 13*l.* to 18*l.* for the former, and from 8*l.* to 12*l.* for the latter, and the men are generally as well satisfied in respect to their food and attention when boarded with the upper servant as those are in the farmer's house. The system of boarding men with a servant is most applicable where a farm is distant from a village, and they are neither so orderly nor so much under control in the evening in a large village as on a detached farm.

The writer occupied for many years four farms, two of strong land, one of good loam, and the other of light sand, in parishes widely distant in the county of Nottingham, and he boarded servants with the foreman on each farm, who were steady and regular in their conduct and work. He was the first in each parish who underdrained land extensively and effectually, and drilled and horsehoed turnips, which were carted off strong land

and stored for cattle in feeding-houses and fold-yards, or for sheep on grass-land in wet weather; and he dispensed with naked fallows, which previously had been prevalent. In each case at the commencement of his tenancy the produce of the several parishes was very inferior to that at present realized: many more cattle and sheep are now well kept and fed in consequence of the draining of wet and retentive lands, autumnal cultivation, using linseed-cake and artificial manure, the drilling of corn and root crops, and carting the latter off heavy land, whilst naked fallows and crops sown broadcast have almost disappeared.

Upon one of the farms of strong land above adverted to, containing 400 acres, 270 acres thereof being arable, 40 acres meadow, and the remainder pasture, the number of beasts kept previously to the year 1825 did not on an average exceed 15, and they were usually very poor in spring, having been wintered partly upon hay grown on wet land, but chiefly upon straw; neither were any beasts fattened at that time. The number of beasts now reared yearly on the farm is about 25; many are bought for feeding in summer and winter, and the general stock of cattle on the farm at all times of the year is about 90. The number of sheep kept on the same farm prior to the year 1825 was less than 200: those sold off were chiefly in a lean state; not more than 150 were clipped, and their wool was inferior. At that time the loss of sheep by rot and other diseases was great. The number of sheep now kept on the farm is nearly 400: the whole are clipped, their fleeces, of superior wool, averaging not less than 8½ lbs. each, whilst those sold are all in a fat state. The loss of cattle or sheep by disease and casualty is now quite trivial. The grass land of the farm has become of greatly increased value in consequence of improvement by drainage and top-dressing; the pasture land formerly was only fit for a very limited number of store cattle, and the artificial grasses kept few sheep. More than 57 acres have been converted from arable land to permanent pasture, and the whole of the pasture land, including artificial grasses, will now fatten cattle and sheep, and the meadows produce more than one ton and a half of good hay and superior aftermath yearly. The great quantity of excellent manure made on the farm causes increased fertility. Although more than four times the number of labourers are now employed on the farm than was the case in and previous to 1825, it yields much greater profit to the occupier than it did at that time, although the rent is increased cent. per cent. with the occupier's approval; but subsequently all these practices have been generally adopted in these parishes, and, together with autumnal cultivation, with a liberal use of linseed-cake and of artificial manures, have led to a great increase in the number of cattle and sheep kept and fed.

The following is a statement of the wages paid to labourers on the said farm of 400 acres, in the year ending the 25th March, 1861, which do not exceed the average of wages paid to each man for agricultural labour in the North Midland counties, Yorkshire and Lincolnshire. The men were employed partly by the day and partly by piece-work. There is full and constant employment, and an industrious labourer having a small working family is enabled to save money.

Labourers employed.

No.	Days employed.	Wages received.			Average per Day		Year's Receipt, including for Family.			Average per Week during the Year.			Remarks.
		£.	*s.*	*d.*	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	
1	313	28	12	0	1	10	43	1	0½	0	16	11	Cowman, occupies a cottage and garden rent free, and has milk and fuel, &c., and is paid for the board of a servant.
2	293	38	13	0	2	7½	52	19	11	1	0	4½	Regular labourers.
3	303	37	0	2	2	5¼	52	13	4	1	0	3	
4	291¼	39	11	3	2	8½	41	13	10	0	16	0½	
5	304½	37	6	5	2	5¼		.		0	14	4¼	
6	298¼	37	5	7	2	6¼		.		0	14	4	
7	304	35	11	8	2	4		..		0	13	8	
8	301½	32	16	8	2	2		..		0	12	7½	
9	246	29	2	8	2	4¼		.		0	13	6½	

A quart of table-beer is allowed to each man daily, and ale in hay time and harvest, and when employed in extra work. Two old men are also employed on the farm at the average wages of about 10s. each per week.

The wages of women are 10*d* a day, and 1s. 6*d*. a day for harvest-work.

The yearly rent paid by a labourer for a cottage and good garden varies from 2*l.* 12*s.* to 4*l.*, the lowest rents being paid to the owners of great estates. The cottages generally are kept in a cleanly state; and although some of them are too small for large families, they are not so over-crowded as in some parts of England.

Full and regular employment is now given to the labouring population in and near those parishes at good wages, and the actual relief paid to the poor has much decreased. In one of the said parishes, containing more than 1500 acres of strong land, more than half arable, the produce of which has been much increased by drainage, the amount paid for the relief of the poor in the year ending 1836 exceeded 2*s.* per acre; whilst on an average for the three years to Lady-day, 1860, the yearly amount paid for the relief and maintenance of the poor has not exceeded 5¼*d.* an acre, in consequence of regular employment being given to the labourers. The present Poor Law has not benefited the occupiers in agricultural parishes where there was previously good and proper management in respect to the labourers and paupers, as the expenses and charges, exclusive of relief, are in such cases additional payments; but in all populous parishes, and in agricultural parishes where employment was not given to the labouring population and where management in respect to the poor was defective, the new Poor Law has been very beneficial.

In one year (about 1821) the parochial rates for the county of Surrey increased to one-third more than they had been in the previous year; and at the same time the parochial rates for the county of Nottingham decreased one-third from the amount paid in the preceding year: which great difference was caused chiefly by the extremely low wages then paid in Surrey and consequent increase of pauperism, and the liberal wages paid in the county of Nottingham, and the general determination to find employment for labourers rather than leave them to become paupers, which is strict economy. A gentleman purchased an estate of about 700 acres in the county of Surrey in 1846, which was in a very inferior state of cultivation. The farms were held on leases, and the tenants employed labourers at wages not exceeding 9*s.* a week, when the wages of labourers in the North-Midland counties and Lincolnshire were from 12*s.* to 14*s.*: in the former case the men employed did not perform half a fair day's work in consequence of weakness and inefficiency, whilst in the latter case the men earned their wages and were profitable to their employers. The owner of the property alluded to began to improve a farm, of which the lease had expired, by draining the wet land, grubbing up hedgerows which were very wide, building, and planting fences, and by bringing the land into a good state of cultivation, which has caused it to produce abundant crops; and he so treated the remainder of the land, as the leases expired, with the like success. To enable him to accomplish the work in a proper manner he materially advanced the wages of the labourers employed, and insisted upon having work done in proportion to the money paid. His example has been followed by others in the neighbourhood, and the general cultivation in that district is improved, the labourers are in a far better condition, and poor-rates have consequently decreased.

The most important among recent improvements in our farm management is the erection of suitable buildings and machinery for cutting fodder and straw, pulping roots and grinding corn for consumption by live-stock. That system is at present only partially adopted; but the advantages derived from it are so obvious in the economy of fodder and roots, and the superiority of ground over unground corn, as shown by the improved condition of stock so fed, that no extensive arable-land farmer should be without such means for using his produce of fodder, straw, root-crops, horse-corn, and inferior corn to the greatest advantage.

Another improvement is the building of tanks for liquid manure, one of which should be considered indispensable for every farmyard. The drainage from feeding-houses, stables, and fold-yards is so invaluable that it ought not to be wasted. The most economical mode for preparing the liquid manure for beneficial effect is, to mix it repeatedly with ashes, which may be readily obtained by burning soil with the cuttings of hedges; and whether ashes so fertilized are used for root-crops, on corn or pasture-land, or on meadow immediately after the hay is cleared off, the advantage to be derived from them will be found very considerable.

Forty years ago the drilling, horse-hoeing, and the growing of turnips according to the most approved system, were chiefly practised in the best-cultivated districts of Scotland and the border counties, particularly Northumberland, at which time the rents in those districts were fully one-third higher and the payments for labour fully one-third lower than in the North-Midland counties and Lincolnshire, where labourers were better paid and maintained than they were in Scotland and Northumberland; but the rents and expenses for labour respectively are now more nearly alike in all those districts—a result which has been brought about by farmers from the north removing southward, by the greatly improved general cultivation of the North-Midland counties and Lincolnshire, and by the scarcity of labourers in the north, which has led to increased wages being given there.

Indeed one remarkable feature in the present aspect of agriculture is the approximation both in prices and management which the diffusion of knowledge and increased power of transit is effecting between the most and least favoured spots, not only in England, but in Europe. We have not so much reason to pride ourselves on the achievements of any one farmer of our day, when compared with the leading men of a former generation, as on the general spread of intelligence, and the general interest felt by those connected with the soil in the full development of its resources.

Ley Fields, Newark.

X.—*The Amount of Capital required for the Profitable Occupation of a Mixed Arable and Pasture Farm in a Midland County.*

By the late CHARLES WRATISLAW.

PRIZE ESSAY.

I SHALL strictly adhere to the first rule laid down by the Society, that all information contained in the Prize Essay shall be founded on experience or observation, and not on simple reference to books or other sources. In specifying the cost of many of the various items of cultivation, I shall set down the sums which I paid myself for the same items by valuation when I entered upon my present farm, and I shall take the cost of the remainder from my day-book.

I do not think that in reality there is much difference in the amount of capital required between an entry at Lady Day and an entry at Michaelmas. In the first case the farmer will no doubt be sooner able to convert his live-stock and part of his corn into money; but then he will have to pay the outgoing tenant for all the cultivations up to that time, which, in the latter case, he will effect himself in all probability in a better manner, as having a more direct interest in the result. In the latter case, although he will have to pay down one half-year's rent, yet, as a counterpoise, he will have the advantage of purchasing his live-stock on better terms than if he had to go into the market when cattle of all descriptions are at their highest price; and, if a prudent man, he will remember that, under any circumstances, he will have one whole year's expenses and but one harvest.

The farm now in my occupation, in the county of Warwick, was undoubtedly at one time a cold, wet clay; but, under the influence of drainage and cultivation, it may now be described as a very retentive loam, having a subsoil of blue lias clay, with veins of sticky yellow clay coming within ten inches of the surface in many places. This may therefore be considered a type of the moderately-rich clay-lands of the county. It is rather peculiarly situated, being bounded on the eastern side by a gravelly soil, from which it is divided only by the high-road; while the farm to the west can be worked with one horse less in a team, and gradually slopes away towards the far-famed Dunsmore Heath.

For the sake of convenience, and using round numbers, I shall suppose that this farm is only 200 acres in extent, divided into twenty fields of 10 acres each, of which 100 acres are arable, and the remaining 100 acres pasture and upland meadow. Suppose then a farmer to have the offer of this farm at Lady Day, and to be called upon to consider what money he will require to pay the outgoing tenant for cultivations, for the purchase of live-stock and implements, and ready money to pay for the other necessary outgoings before he can begin to reap any return from his exertions. And in order that the expense of each mode of farming may be considered, suppose that the 100 acres of pasture and upland meadow comprise two fields of 10 acres each, suitable for fattening cattle of a medium size; two fields of 10 acres each, suitable for dairy purposes; three fields of 10 acres each, more adapted to rearing store-stock; and the remaining three fields of 10 acres, suited for mowing.

In selecting the stock to be fattened I should be guided, not only by the richness of the fields themselves, but also by the means the arable land placed at my disposal for wintering the cattle. In the present instance the arable land does not permit me to grow with advantage roots to be drawn off for the cattle and consumed with the straw (which itself is principally reedy wheat-straw), neither is it light enough for sheep to consume turnips on the ground. The horses will also require most of the clover-hay, and the dairy cows and young stock the meadow-hay. And as pasture-land of this description will not bear treading by cattle in the winter, they must all be in enclosed yards without the benefit of a walk. I should therefore give the preference to Welsh cattle (the black breed of South Wales), as they are more hardy, will do better on worse food, fatten rather more quickly, and of late years have been of more ready sale in consequence of the thickness of their hides; and I should prefer cows and heifers to oxen because they are more readily sold in the country, come to perfection sooner, and if a few of them chance to be in calf, they are easily turned over to the dairy, when any cow that is not doing her part in that department may be dried and turned out to fatten. After trying both short-horn and Welsh cows for butter-making purposes, I have come to the conclusion that, on moderately-rich, cold land, the Welsh cows are the most profitable. They do not cost so much in the first instance; and although they do not yield so much milk as the short-horn, and are therefore not so suitable for cheese-making, still, if carefully selected, they will average nearly as much butter, fatten their calves quite as soon, particularly if they have been put to a short-horn bull,* and are ready when dry to go to the straw-yard, and take their turn afterwards on the fattening-land. The store-land may either be grazed with young short-horn beasts, to be sold at the end of the year for others to fatten, or, with Welsh beasts, to be transferred to the fattening or dairy parts of the farm as others are drafted off; but I consider that it is most profitable to have some of each description so as to meet all markets.

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* Mr. Wratislaw reckoned that these cows, if they received 2 lbs. of cake per day, would on an average give 8 lbs. of butter per week. He considered that an increase of 1 lb. of butter per week was gained by each pound of cake which, within moderate bounds, was added to their daily diet. The calves were always fattened, and generally sold at the age of 6 or 7 weeks, when they weighed about 20 lbs. per quarter.—P. H. F.

On this kind of land it is much safer not to keep a breeding flock of sheep, but to have one-shear wethers for wintering on the grass-land, about one to the acre, which, with the assistance of a little corn or cake, will be fat by shear-day; besides these, tegs should be bought in the spring to consume the vetches on the arable land, and then be drafted on to the grass-land as the then two-shear sheep are sold to the butcher. The farmer is thus able not only to give the sheep a change of food, which is a great advantage in itself, but, by keeping a large number on his arable land, to manure an additional field at a very trifling expense, whilst he sells two lots of animals off the land in the course of the year.

A farmer then entering at Lady-day on 70 acres of pasture-land of the quality above described, exclusive of that reserved for mowing, will require the following quantity of live-stock :—

		£.	s.	d.
For the first field of 10 acres of fattening land :—				
8 Welsh cows or heifers, at 9*l*. each	£72 0 0			
10 shearhog sheep, at 2*l*. 10*s*.	25 0 0			
		97	0	0
For the second field of 10 acres of fattening land :—				
The same description of stock		97	0	0
For the two fields of 10 acres each for dairying, which will be either grazed together or alternately :—				
15 Welsh cows, costing in-calf or with their calves, 10*l*. each		150	0	0
For the first field of 10 acres of store land :—				
7 Welsh cows or heifers, at 8*l*.	£56 0 0			
15 shearhog sheep, at 2*l*. 10*s*.	37 10 0			
		93	10	0
For the second field of 10 acres of store land :—				
The same description of stock		93	10	0
For the third field of 10 acres of store land :—				
6 shorthorn steers, at 9*l*.	54 0 0			
15 shearhog sheep, at 2*l*. 10*s*.	37 10 0			
		91	10	0
He ought also to have two breeding sows, say at 5*l*. each, and two rearing pigs for the winter's feeding, say 25*s*. each, to consume the skim-milk, &c.*		12	10	0
He will also require sheep for folding on the vetches grown upon the arable land. Supposing him to have a good average crop on 10 acres, and to draft the sheep on to his pasture-land as the two-shear sheep are sold off; he may start with 14 to the acre for 6 acres, or 84 at 2*l*.		168	0	0
(Thus leaving 4 acres for soiling his plough-horses in the yards.)				
Carried forward		803	0	0

These were designed for *home* consumption.]

		£ s. d.
Brought forward		803 0 0
He will also require 6 plough-horses to work the arable part of his farm, 4 of which I shall consider will be older horses, constantly in the stable, and fed on vetches, hay, and corn; the two others, younger ones, lying with the dairy-cows, and worked alternately to ease the older horses, and also to make the 4-horse team into two teams of three horses each for cleaning the land after harvest. I shall presume that the farmer will take pride in his team, and have his horses not only up to their work, but such as he can sell when six years old for the London market. I shall therefore estimate that he will have—		
Two 5-year-old horses, worth 40*l.* each ..	£80 0 0	
Two 4-year-old horses, worth 35*l.* each	70 0 0	
Two horses rising two years, ready for breaking, worth 30*l.* each	60 0 0	210 0 0
He will therefore have 51 beast and 65 sheep on his pasture-land, 84 sheep on his arable land, 4 pigs, and a team of 6 horses, at a total cost of		£1013 0 0

He will then have to pay the outgoing tenant for his growing crops and cultivations. In making out this account I have specified the amount which I paid myself by valuation for each act of husbandry. For convenience of calculation I shall suppose that the spring-crops have been sown by the outgoing tenant, instead of saying merely that the incoming tenant ought to have so much money in his pocket to complete the spring sowing of his farm.

There are also always some things to be taken as tenant's fixtures, &c., hay and horse-corn to be bought, and rates and taxes to be paid; but as these would depend upon accidental circumstances, and must therefore be entirely conjectural, I have preferred to omit them as such, but to include in my estimate not only the money a farmer would require for immediate payments, but also the probable expense he would be put to in hoeing, weeding, and also cutting and harvesting his corn and hay. I have assumed also that he makes nothing from his farm for the first six months. This would, I believe, fully cover all he would have to pay for the fixtures, hay, &c., which I have not included in the estimate for the reasons above given.*

The arable part of the farm, being divided into ten fields of

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* A revision of this passage was contemplated. Apart from the undesirableness of setting such considerable items one against the other without investigation, the probability is that they would not balance, as a rough approximation may easily indicate. The 65 shearlings would probably bring in with their wool 170*l.*, with some allowance for losses; the wool of the 85 tegs 30*l.*; or there would be 200*l.* in all of receipts. Per contra, if the corn of the 4 horses and colts used occasionally for the five summer months may be set at about 25*l.*, the stock of hay at 50*l.*, the farm fixtures at 25*l.*—in all 100*l.*—these receipts will exceed the payments by 100*l.*—P. H. F.

10 acres each, would at Lady Day, if tolerably clean, according to the usual rotation of fallow, wheat, seeds, and beans, wheat, beans, and wheat, be cropped in the following manner at the expense set opposite the several items:—

				£	s.	d.
The first field of 10 acres will be wheat after a bare fallow, the cost of which will be:—						
First ploughing, at 15*s*. per acre	£7	10	0			
Second ditto, back, at 10*s*. per acre	5	0	0			
Third ditto, across, at 10*s*. per acre	5	0	0			
Scufflings, at 15*s*. per acre	7	10	0			
Ploughing for seed, at 10s. per acre	5	0	0			
Drilling, at 5*s*. per acre	2	10	0			
Harrowing, at 1*s*. 6*d*. per acre	0	15	0			
Two bushels of seed-wheat per acre, at 7*s*. per bushel	7	0	0			
One year's rent, say 2*l*. per acre	20	0	0			
One year's rates, say 3*s*. 6*d*. per acre	1	15	0			
				62	0	0
The second field of 10 acres, wheat after vetches:—						
First ploughing, at 15*s*. per acre	7	10	0			
Second ditto, across, at 10*s*. per acre	5	0	0			
Scufflings, at 15*s*. per acre	7	10	0			
Ploughing for seed, at 10s. per acre	5	0	0			
Drilling, at 5*s*. per acre	2	10	0			
Harrowing, at 1s. 6*d*. per acre	0	15	0			
Two bushels seed-wheat per acre, at 7*s*. per bushel	7	0	0			
One year's rent, say 2*l*. per acre	20	0	0			
One year's rates, say 3*s*. 6*d*. per acre	1	15	0			
				57	0	0
The third field of 10 acres, wheat after clover:—						
One ploughing, at 15*s*. per acre	7	10	0			
Sowing, 5*s*.; harrowing, 2*s*. 6*d*.: = 7*s*. 6*d*. per acre	3	15	0			
Two bushels seed-wheat per acre, at 7*s*. per bushel	7	0	0			
One-third of rent and rates (2*l*. 3*s*. 6*d*. per acre) for herbage ploughed in, at 14*s*. 6*d*. per acre	7	5	0			
				25	10	0
The fourth field of 10 acres, wheat after spring beans:—						
One ploughing, at 15*s*. per acre	7	10	0			
Sowing, 5*s*.; harrowing, 2*s*. 6*d*.: = 7*s*. 6*d*. per acre	3	15	0			
Two bushels seed-wheat per acre, at 7*s*. per bushel	7	0	0			
				18	5	0
The fifth field of 10 acres, wheat after spring beans:—						
At the same cost as the last				18	5	0
The sixth field of 10 acres, vetches after wheat:—						
One ploughing, at 15*s*. per acre	7	10	0			
Sowing, 5*s*.; harrowing, 2*s*. 6*d*.: = 7*s* 6*d*. per acre	3	15	0			
*Two bushels of seed per acre, at 10*s*. per bushel	10	0	0			
				21	5	0
Carried forward				202	5	0

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* The price charged ought in most seasons to compensate for the small quantity of seed allowed.

				£	s.	d.
Brought forward				202	5	0
The seventh field of 10 acres, spring beans after wheat:—						
Manuring, 15 two-horse loads, filling, carting, and spreading, at 15*s.* per acre	7	10	0			
One ploughing, at 15*s.* per acre	7	10	0			
Dibbing, at 7*s.* 6*d.* per acre	3	15	0			
Harrowing, at 2*s.* 6*d.* per acre	1	5	0			
Three bushels of seed per acre, at 5*s.* per bushel	7	10	0			
				27	10	0
The eighth field of 10 acres, spring beans after wheat:—						
At the same cost as the last				27	10	0
The ninth field of 10 acres, clover after fallow wheat:—						
The seed bill, whatever it may be, is generally charged, say—						
60 lbs. red clover, at 9*d.* per lb.	2	5	0			
40 lbs. cow-grass, at 10*d.* per lb.	1	13	4			
20 lbs. Timothy, at 8*d.* per lb.	0	13	4			
20 lbs. trefoil, at 4*d.* per lb.	0	6	8			
Sowing, 2*s.* 6*d.*, harrowing, 1*s.* = 3*s.* 6*d.* per acre	1	15	0			
				6	13	4
The tenth field of 10 acres, bare fallow after wheat					..	
				£263	18	4

	£	s.	d.
The above 50 acres of wheat and 20 acres of beans will require to be hoed and weeded, which, if well done, will on an average cost 8*s.* per acre *	28	0	0
The 50 acres of wheat will also cost about 14*s.* an acre for reaping if no beer is given, 3*s.* 6*d.* an acre carting and stacking, including team labour; 1*s.* per acre paring and finishing the ricks; and 1*s.* 6*d.* per acre thatching; or 1*l.* per acre	50	0	0
The 20 acres of beans will also cost about 10*s.* an acre hacking; 3*s.* 6*d.* carting and stacking; 1*s.* paring; and 1*s.* 6*d.* thatching; or 16*s.* per acre	16	0	0
The 30 acres of upland meadow-hay and the 10 acres of clover-hay will, by the time the hay is stacked and thatched, have cost about 18*s.* per acre	36	0	0
There will also be required, in addition to the piece-work included in this account, 3 months' wages for 4 men—viz., a waggoner, a shepherd, and two labourers without beer at 13*s.* each per week—and one boy, at 3*s.* 6*d.* per week	33	6	0
	£163	6	0

The farmer's next care will be the selection of his implements. The amount of money which he will require for this purpose will depend in some measure on the situation of his farm and buildings, and whether the latter are placed within a convenient distance of his arable and meadow land or not. If this is not the case, an extra horse and cart, with driver and horse-tackle, will be required. But supposing that the fields are so conveniently arranged that he can do all his carting and manuring with three carts, one of which will be loading whilst another is being unloaded, and a third on its way to and fro, then by having gearing to the carts he will be able to avoid the extra expense of purchasing waggons for carting his corn, &c., and will only require—

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* This sum had been actually paid on the farm to get the wheat thoroughly hoed. It was admitted that 5*s.* per acre was for wheat a high price, and a sufficient allowance for the district.—P. H. F.

	£.	*s.*	*d.*
1 waggon to carry corn to market, &c.	30	0	0
3 carts with gearing to take off, at 15*l.*	45	0	0
Tackle for 6 horses, at 4*l.* 17*s.* 6*d.*	29	5	0
2 iron ploughs with skim coulter, &c., at 4*l.* 17*s.* 6*d.*	9	15	0
2 wooden ploughs, at 3*l.* 10*s.*	7	0	0
2 plough bends and traces, at 10s.	1	0	0
1 sheet-harrow	2	10	0
1 pair 3-horse harrows	3	14	0
1 pair 2-horse ditto	2	11	0
1 pair 1-horse ditto	2	2	0
Scuffle	6	10	0
Wood roll	2	10	0
Scuffle-drill [*]	7	0	0
Weighing-machine	5	0	0
Sack-barrow	0	5	0
80 sack-bags, at 1*s.* 7*d.*	6	6	8
Bushel-measure	0	12	0
Winnowing-machine	12	0	0
Seed-hopper	0	3	6
Barn-shovel	0	3	6
3 ladders of 45, 30, and 15 rounds respectively, at 10*d.* per round	3	15	0
3 cart-ropes, at 7*s.* 6*d*	1	2	6
3 hand-drags, at 12*s.* 6*d.*	1	17	6
10 hay-forks, at 3*s.* 6*d.*	1	15	0
Chaff-cutter	4	10	0
Oat and bean mill	6	6	0
4 pig-troughs, at 10s.	2	0	0
Dung-drag	0	2	6
Churn and butter-river, &c.	2	5	0
Wheelbarrow, buckets, spades, and sundry tools	5	0	0
12 dozen hurdles, at 8*s.*	4	16	0
	£206	17	2

Forming a total of—	£.	*s.*	*d.*
Live stock	1013	0	0
Cultivations	263	18	4
Labour	163	6	0
Implements	206	17	2
	£1647	1	6[†]

Or in round numbers 8*l.* 5*s.* per acre.

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[*] It was the author's purpose to describe this scuffle-drill, and to call attention to its merits as adapted to strong soils. The rate of charge, however, which it seems was allowed by custom for the work done by it—viz, 5*s.* per acre—leads to the impression that a more high-priced implement would be more economical.—P. H. F.

[†] The amount of capital required would probably be decreased by about 100*l.*, in consequence of the proceeds from sales of sheep and wool before harvest,

The farmer might doubtless purchase many of his implements at a less price secondhand; it must, however, be borne in mind that this list is confined to such implements as are *absolutely essential*, others being here omitted which would be most useful, and would no doubt be obtained at the first opportunity. I believe the above estimate will be found in practice to approximate to the amount of capital required on average clay-farms in the midland counties, and that it may be relied on by any one about to enter upon a farm of this description.

I will now proceed to give an estimate of the capital required for the profitable occupation of 100 acres of turnip and barley-soil, which I am able to do from having had the management of a farm of this description on a gravelly subsoil. I do not know personally the expense of taking a farm on the Downs, and shall therefore not attempt to give an estimate of the expense of working such land.

Supposing, therefore, that 100 acres of land, capable of growing turnips and barley to advantage, were conveniently divided into ten fields of 10 acres each, and that the Norfolk rotation of one-fourth turnips and vetches, one-fourth barley, one-fourth seeds or pulse, and one-fourth wheat was followed. Then—

				£.	s.	d.
The first field of 10 acres would be turnips after wheat, at a cost of:—						
*First ploughing, at 12*s.* per acre	£6	0	0			
*Second ditto, across, at 10*s.* per acre	5	0	0			
*Scuffling once, at 5*s.* per acre	2	10	0			
Rolling and harrowing, at 3*s.* 6*d.* per acre ..	1	15	0			
*Raking and burning twitch and weeds, at 10*s.* per acre	5	0	0			
*Manuring, at 15*s.* per acre	7	10	0			
*Ploughing for seed, at 10*s.* per acre	5	0	0			
2½ lbs. turnip-seed per acre, at 1*s.* per lb.	1	5	0			
*Drilling and rolling, 5*s.*; harrowing, 1*s.*: = 6*s.* per acre	3	0	0			
Hoeing twice, at 8*s.* per acre	4	0	0			
Weeding, at 2*s.* per acre	1	0	0			
1 year's rent, say at 2*l.* per acre	20	0	0			
1 year's rates, at 3*s.* 6*d.* per acre	1	15	0			
				63	15	0
The second field of 10 acres will be turnips after wheat:— At the above expense of				63	15	0
The third field of 10 acres will be divided into two parts of 5 acres each:—						
The first 5 acres will be vetches after wheat, costing—						
5 acres ploughed, at 10*s.* per acre	2	10	0			
Sowing, 5*s.*; harrowing, 1*s.*: = 6*s.* per acre ..	1	10	0			
2 bushels of seed per acre, at 10*s.* per bushel ..	5	0	0			
				9	0	0
Carried forward				136	10	0

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exceeding by that amount the items of outlay omitted in this account, as shown in a previous note.—P. H. F.

				£.	s.	d.
Brought forward				136	10	0
The second 5 acres will be beans or peas after barley :—						
5 acres ploughed, at 10*s.* per acre	2	10	0			
Filling, carting, and spreading manure, at 15*s.* per acre	3	15	0			
Sowing, 5*s.*; harrowing, 1*s.*: = 6*s.* per acre	1	10	0			
3 bushels of seed per acre, at 5*s.* per bushel	3	15	0			
				11	10	0
The fourth field of 10 acres will be barley after turnips :—						
First ploughing, at 10*s.* per acre	5	0	0			
Ploughing across, at 10*s.* per acre	5	0	0			
One scuffling, at 5*s.* per acre	2	10	0			
Drilling, rolling, and harrowing, at 6*s.* per acre	3	0	0			
2 bushels of seed per acre, at 5*s.* per bushel	5	0	0			
				20	10	0
The fifth field of 10 acres will be barley after turnips :—						
At the same cost as above				20	10	0
The sixth field of 10 acres will be divided into two equal parts of 5 acres :—						
The first 5 acres of which will be barley after vetches, costing—						
One ploughing, at 12*s.* per acre	3	0	0			
Ditto across, at 10*s.* per acre	2	10	0			
Scuffling, at 5*s.* per acre	1	5	0			
Rolling and harrowing, at 3*s.* 6*d.* per acre	0	17	6			
Raking and burning twitch and weeds, at 10*s.* per acre	2	10	0			
Ploughing for seed, at 10*s.* per acre	2	10	0			
Drilling and harrowing, at 6*s.* per acre	1	10	0			
2 bushels of seed per acre, at 5*s.* per bushel	2	10	0			
				16	12	6
The second 5 acres will be wheat after peas or beans :—						
Ploughing, at 10*s.* per acre	2	10	0			
Drilling, rolling, and harrowing, at 6*s.* per acre	1	10	0			
2 bushels of seed per acre, at 7*s.* per acre	3	10	0			
				7	10	0
The seventh field of 10 acres will be seeds after barley, and supposing the following quantity of seed is sown :—						
60 lbs. red clover, at 9*d.* per lb.	2	5	0			
40 lbs. cow-grass, at 10*d.* per lb.	1	13	4			
20 lbs. timothy, at 8*d.* per lb.	0	13	4			
20 lbs. trefoil, at 4*d.* per lb.	0	6	8			
2½ bushels rye-grass, at 6*s.* per bushel	0	15	0			
Sowing, 2*s.* 6*d.*; harrowing, 1*s.*: = 3*s.* 6*d.* per acre	1	15	0			
				7	8	4
The eighth field of 10 acres will be seeds after barley :—						
At the same cost as above				7	8	4
The ninth field of 10 acres will be wheat after seeds :—						
Ploughing, at 10*s.* per acre	5	0	0			
Drilling, rolling, and harrowing, at 6*s.* per acre	3	0	0			
One-third rent and rates for herbage, ploughed in at say 2*l.* 3*s.* 6*d.* per acre, at 14*s.* 6*d.*	7	5	0			
2 bushels of seed-wheat per acre, at 7*s.*	7	0	0			
				22	5	0
The tenth field of 10 acres will be wheat after seeds :—						
Costing as above				22	5	0
Total				£272	9	2

	£.	s.	d.
The above 25 acres of barley and 25 acres of wheat will require weeding, and the 5 acres of beans or peas will require hoeing, at a probable expense of 4*s.* per acre	11	0	0
The 25 acres of barley will cost about 4*s.* 6*d.* an acre mowing; 5*s.* 6*d.* turning, cocking, carting, raking, and stacking, including team labour; 1*s.* paring and finishing ricks; and 1*s.* 6*d.* thatching; in all, 12*s.* 6*d.* per acre	15	12	6
The 25 acres of wheat will cost about 12*s.* an acre reaping; 3*s.* 6*d.* carting and stacking; 1*s.* paring and finishing ricks; and 1*s.* 6*d.* thatching; in all, 17*s.* 6*d.* per acre	21	17	6
The 5 acres of beans or peas will cost about 9*s.* an acre hacking; 3*s.* 6*d.* carting and stacking; 1*s.* paring and finishing; and 1*s.* 6*d.* thatching; in all, 15*s.* per acre	3	15	0
The 20 acres of clover-hay, if no part is grazed with sheep, will cost, by the time it is stacked and thatched, about 15*s.* per acre, or	15	0	0
For the purpose of comparison with the foregoing estimate for a clay farm, I must here insert the same expense for cutting and harvesting the 30 acres of meadow-hay, 18*s.* per acre	27	0	0
There will also be required 3 months' wages without beer for 4 men—a waggoner, a shepherd, and two labourers—say 13*s.* each per week, and a boy at 3*s.* 6*d.* per week	33	6	0
Total	£127	11	0

This will, I believe, be sufficient, as the turnip-hoeing and also the harvesting the corn, &c., are included above under their several heads.

A farmer occupying this kind of soil would most probably winter breeding-ewes on his grass-land instead of shear-hogs, as estimated for on the clay-land, but at much the same cost. After drawing part of his turnips off for the beasts to eat with the straw in the yards, he would consume the remainder on the land by means of the lambs. If he had a good average crop of turnips, he might calculate upon their carrying 15 lambs per acre for the 16 winter weeks. As these would correspond in value, though not in numbers, to the sheep required to consume the vetches on the clay-land, I do not propose to make any difference under the head of live-stock for a light-land farm of moderate richness.

A lighter class of horse could also be used; but if the farmer looked forward to selling them at 6 years old for first-class farm-horses, he would not be able to make any material deduction in their first cost. It may, however, be generally assumed that one team, whether it require to be of 4 horses, 3 horses, or 2 horses, will cultivate 80 acres of land in due course of husbandry.

There would also be some little difference in particular implements from those above specified in details; but it would be extending this Paper to too great a length to recapitulate them. The principal alterations would be, the substitution of a third iron plough for the two wooden ones, and the addition of a turnip-drill, a turnip-cutter, and three sets of G O tackle. But I do not think there would be any very material difference in the total cost of the implements. Should, however, the pasture-land, whether on a clay or a light subsoil, be rich enough to carry cattle of a larger size, more money must be allowed for their purchase than I have before specified. There will, however, be no difference in the value of the sheep. But, to make this Essay more generally applicable and available, I will give the following estimate for 70 acres of such pasture-land, divided as before into seven fields of 10 acres each, which, with 30 acres for mowing, will make altogether 100 acres. The first fattening-field of 10 acres will therefore require—

				£.	s.	d.
8 beast, at 13*l.* each	£104	0	0			
10 sheep, at 2*l.* 10*s.* each	25	0	0	129	0	0
The second fattening field of 10 acres :—						
The same as the above, at a cost of				129	0	0
The two fields of 10 acres each for dairying, allowing 1½ acres to each cow, will require :—						
15 cows, at 15*l.* each				225	0	0
The first store-field of 10 acres :—						
7 beast, at 11*l.* each	77	0	0			
15 sheep, at 2*l.* 10*s.* each	37	10	0	114	10	0
The second store-field of 10 acres :—						
The same as the above, at a cost of				114	10	0
The third store-field of 10 acres :—						
The same as the above				114	10	0
For the purpose of comparison, I shall add the same amount I have previously stated for pigs, 12*l.* 10*s.*; sheep on vetches, 168*l.*; and horses, 210*l.*				390	10	0
Total				£1217	0	0

The total capital therefore required for the profitable occupation of a clay-farm of 200 acres of medium richness, as first mentioned, will be—

	£.	s.	d.
Live Stock	1013	0	0
Cultivations	263	18	4
Labour	163	6	0
Implements	206	17	2
Total	£1647	1	6

Or, in round numbers, 8*l.* 10*s.* per acre.

For a clay-farm of 200 acres, with a richer description of pasture-land—

	£.	s.	d.
Live Stock	1217	0	0
Cultivations	263	18	4
Labour	163	6	0
Implements	206	17	2
Total	£1851	1	6

Or 9*l.* 10*s.* per acre.

For a light-land farm of 200 acres of medium richness—

	£.	s.	d.
Live Stock	1013	0	0
Cultivations	272	9	2
Labour	127	11	0
Implements	206	17	2
Total	£1619	17	4

Or 8*l.* per acre.

For a light-land farm of 200 acres with a richer description of pasture-land—

	£.	s.	d.
Live Stock	1217	0	0
Cultivations	272	9	2
Labour	127	11	0
Implements	206	17	2
Total	£1823	17	4

Or 9*l.* per acre.

As so much of the capital required in farming depends upon the cost and economical application of manual labour, and more attention has been paid of late years to the comfort and condition of the agricultural labourer, I think that a short account of the mode in which I deal with my men will not only be interesting to those who are desirous of promoting their social improvement—a matter in which I am myself much interested, but will not be out of place in this Essay considered in a commercial light only.

When I entered on my present farm, seven years ago, I found everything had been allowed to go out of repair—even the rick-pillars were broken down and the ricks built upon their ruins or upon the ground; and hardly in any place did I find two unbroken rails standing together in the rickyard-fence. The labourers were dissatisfied, only partially employed, and even sent home at 8 or 12 o'clock in the day if the weather turned out unfavourable after they had come to work in the morning, thus being allowed to make only part wages however willing they might be to work. The landlord of course had the rick-pillars rebuilt and the fences repaired, and I set to work to put the labourer upon a different footing. I took for some days the opportunity of quietly watching the labourers who had previously been employed on the farm, at their work, and selected those who appeared most likely to answer my purpose. The wages paid at that time to the best men, when a whole week's work was done, were 11*s.* per week from Michaelmas to Lady-day, and 11*s.* to 12*s.* per week, with a daily allowance of 1 quart of beer per man per day, from Lady-day till Michaelmas. There was an extra allowance in harvest-time of 1 quart of beer and 1 gallon of ale per man per day, although in practice the allowance was unlimited when carting was going on.

	£.	*s.*	*d.*
I calculated that the one quart of beer per day from Lady-day to Michaelmas, at 6*d.* per gallon, was 9*d.* per week, or for the whole period	0	19	6
The extra quart of beer per day at 6*d.* per gallon, and the gallon of ale at 1s. per gallon, for the six weeks during which the hay and corn harvests and covering in the ricks usually last, was	2	0	6
Making a total cost for beer per man of	£3	0	0

In consequence of the constant disputes about the beer, and the discontent which I had seen ensue at different places when a petition for more beer had been refused, I determined not to give any beer, but a money allowance instead. This I thought would not only put an end to a constant source of annoyance, but would enable me to ascertain the exact cost of every act of husbandry. I therefore informed the men one Saturday night that I intended to give no beer. At this they were disposed to murmur, but I set that to rights by informing them that during a great part of the time they really did not want the beer, and that they would find coffee better for them, although they could not do without beer in harvest time or when they worked extra hours; and by asking them whether the beer they received was worth 2*l.* 12*s.*, or 1*s.* a week for the year, to each of them. They admitted that it was not, and I then offered to hire them from that time, Lady-day, till the following Michaelmas at 13*s.* per week without beer, they being bound to serve me, and I to find them work, wet or dry, and to give them so much of the harvest work by the piece as they could do well. They accepted this offer, having only the alternative of leaving. Of course it was not necessary for me to show them that I was a clear gainer by the transaction, the extra 1*s.* a week, or 26*s.* for the time, being much less than the cost of the usual allowance of beer. But I considered that I was doing them no injury, inasmuch as I was to find them regular work for the whole time, whether immediately profitable to myself or not.

This being an entirely new mode of proceeding in this part of the country, I anticipated some little difficulty in carrying it out. The men, however, seemed very pleased with their full pay, and everything went on very smoothly until haymaking began, when a few of the men began complaining that they could not work without beer. Bottles were very ostentatiously filled with water at the ponds, and their contents drunk, as a hint to me. I took no notice of this except by a good-humoured joke, advising them to get their wives or sweethearts to make them a good lot of tea or coffee to bring with them the next day, as they would find that better than the water. These hints not being sufficient to soften my hard heart, more open murmuring was tried, and the men began to work carelessly, coming off the rick to go to the ponds or pumps to drink after unloading one load, and before they would commence another. They also exhibited other signs of mutiny. This of course could not be allowed, and after calling the men together, I told them I was not going to stand any such nonsense; I had kept my part of the bargain and they must keep theirs. They had had their money, and if they chose to spend it in other ways than in buying beer, it was no concern of mine. But I would have the work done, and I expected them out of their wages to buy such a quantity of beer as would enable them to work properly. Finally, I ended by offering to release any of them who wished it from their bargain upon their returning me the extra 1*s.* that I had paid them. But I said they might depend upon one thing, that I would let all the hay rot on the ground before I allowed my men to master me. One man began grumbling: I said, "Here is your money till to-day; take your clothes and go off the premises instantly." There was no more trouble; the others all returned to their work, and from that day till this I have never heard one word about beer.

We soon got to understand each other better, but I never offered to pay them for overtime, putting them on their honour, as it were, and giving a moderate quantity of beer as an acknowledgment, when the work was kept on after eight o'clock at night, and telling them that we should not disagree at Michaelmas. At Michaelmas I gave to each man who had behaved well, whether he continued with me or whether I replaced him by another, half a ton of the best coal, which is worth here from 9*s.* to 10*s.* delivered. At Michaelmas also no man to whom I made the offer hesitated to accept my offer of 13*s.* a week for the next twelve months, and with the exception of what occurred during the first summer I have never had a dispute with my men, and once only have I had to punish a man for refusing to work.

I still continue giving at Michaelmas to every man who has been with me the preceding six months at least, and behaved well, coals, a waterproof cape, flannel, or some other thing which he selects as most useful to him; I also give the boys a proportionate allowance. My labourers and I now work together upon the most cordial terms; I never have a man offer to leave me. I have the pick of the village, although I let them clearly understand that I can make no more of my produce than my neighbours, and will pay no more for labour. But at the same time they perfectly understand that I am willing to pay in such a manner, as to enable them to make the most of their strength and skill.

I consider for my own part that, taking the average wages usually paid here to the best man for the twelve months at 11*s.* 6*d.* per week without beer, adding 1*s.* per week or 2*l.* 12*s.* per annum for beer (although the calculation above made shows that the beer actually costs more), and also 6*d.* per week or 26*s.* per annum for extra beer, making in the whole 13*s.* a week, and setting it all against the overtime, for which I do not pay, my labour does not actually cost me more than other people pay for theirs. And if a man is able out of his 11*s.* 6*d.* a week to clothe and maintain himself and his family, and pay his rent also, then I consider that the extra 1*s.* 6*d.* a week, which is spent entirely on food as I arrange it, ought to give me a man physically more fit to do his work. And in practice I find this to be the case. I have not only the gratification of being told by the vicar, that my men, both married and single, are amongst the most respectable and well-conducted in the village, but I have been repeatedly told by the neighbouring farmers: "I can't think what you do with your men. As soon as my back is turned I have little work done, but come by your farm when I will, your men are always at work." A labourer who feels himself well used will soon repay his master 2*d.* a day, or 1*s.* a week, by working with a will and not idling.

I should not be doing justice to the men themselves if I closed this part of my Essay without stating that, independently of a good day's work being given for a good day's pay, there is such a good feeling amongst them, that several times in the course of a year, when it has been a very wet day, I have found them not come to work, preferring to forfeit their wages rather than ask me for work when they knew that there was none of a nature immediately profitable to me to be done. And this they have done notwithstanding that they are well aware that I am bound to pay them, wet or fine, if they come, and that I always contrive to have some jobs which can be done under cover at such times. I also pointed out to them the best way of buying their beer. Each man now buys for his own consumption one 18-gallon cask of ale at 1*s.* a gallon, and another 18-gallon cask of beer at 6*d.* per gallon, direct from the brewer, instead of purchasing it at double that price in small quantities at the public house. This again gives them to spend in extra beer or anything else they like, 25*s.* per annum, being the difference between the actual cost of the beer they buy, and the 2*l.* 12*s.* I allow for it. The first year I guaranteed payment to the brewer, but ever since that time they have easily obtained credit. But I fancy they have seldom availed themselves of that facility since I showed them that by paying cash they could get 5 per cent. discount upon it. During the late very untoward season I secured all my hay (more than 30 acres) in first-rate condition during the few fine days we had, without using a tedding machine, and carried and stacked my corn (nearly 100 acres) in quite as good order as my neighbours. To effect this, notwithstanding that I often kept on carrying until 10 or 11 o'clock at night, one 18-gallon cask of 1*s.* ale, and two or three lots of soup, were all the extra supplies and expenses required. I consider that by not idling about my men save me in the course of the year much more than the value of the coals, &c., which I give at Michaelmas, although that is a gratuity entirely within my own discretion, and no part of the bargain which I make with them.

Rugby.

Some circumstances attending the publication of the preceding Essay seem to call for explanation to account for its not having received that amount of correction and revision which had been intended. The author met the editor at Leeds by agreement; discussed with him the pages relating to the heavy-land farm; made an appointment for the next day to report upon the suggested alterations, and continue the revision; but in the interval he was seized by an illness which terminated fatally in three or four days. An acquaintance thus brief had, however, sufficed to inspire a lively interest and proportionate regret for the sudden death of one whose business-like habits, acuteness, and zeal gave promise of valuable service to the cause of agriculture.

The question then arose, How was the Essay to be dealt with? It is essential that those substantial corrections which may often be serviceably introduced into treatises should be made with the concurrence of the author; short of this it would be rash in the extreme to make any change before opportunity has been afforded to him of explaining and justifying his position.* In the present case the value of the contribution much depends on the fact, that, in the main, the items in the account have either been actually allowed by a valuer, or paid by the author, and entered in his day-book; and if some few rest on a theoretical basis from facts ascertained on one kind of farm having been imported somewhat conjecturally into the other, or from the difficulty of making a neat join between two tenancies, the extent of these theoretical items cannot in the first case be now ascertained, or readily diminished in the second by readjustment of the calculations. The Essay must stand therefore as, on the whole, a careful record of facts applicable to a certain district.

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* There are considerations which point strongly to the inexpediency of pressing forward publication until not only the work of adjudication, *a task which cannot be hurried*, but also that of revision by editor and author *conjointly*, has been deliberately performed. Under any circumstances, the essays of unsuccessful competitors returned upon the award being announced, will often get a priority in publication. It will rest with author and editor, by subsequent painstaking, to convert perhaps a slight advantage in merit into a substantial superiority. But concert, time, and a stock in hand are essential to reconcile these aims and ends with the demands for punctual publication.

If we attempt to pass from the consideration of that which has been done on one spot to what should be the general practice, the divergence will perhaps be so considerable under the head of cultivation, that no amount of revision could have reconciled our aspirations with the record before us.

In one point of view only can I regard the item "cultivation" with any satisfaction, viz., that after all, it bears but a small proportion to the entire sum required for taking and stocking a farm, yet it must not be overlooked that this is almost the only head which it is in our power materially to modify. Our grounds of dissatisfaction are twofold:—

1st. That in spite of the aspirations and lively anticipations of many of the most able and practical writers on agriculture over a series of years, these numerous ploughings still commonly hold their ground in making a turnip-fallow; and

2ndly. That, in the event of a change of tenancy, the works of tillage to be performed are too often left to the choice of the outgoing tenant, or the now arbitrary decision of tradition and custom, and that the rate of payment allowed for them by that same custom is generally excessive.

To show what these aspirations have been, two references will suffice; one of early, another of recent date:—

In vol. xi. p. 423 of this 'Journal,' Mr. Pusey, when describing the work of making a fallow after the old fashion, with its winter-ploughing, followed by spring-ploughing, dragging, scarifying, heavy-rolling, harrowing, light-rolling, and picking,—a series of operations "to be repeated a second, and very likely a third time," adds, "all this I have done, and done for the last time." He then quotes from Bayldon a schedule of operations, costing 2*l.* 9*s.* 6*d.** in all, and is sanguine enough to anticipate

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	Per Acre £	s.	d.
First ploughing at Christmas, at the rate of ¾ of an acre a day	0	10	0
Second ploughing in the spring, at 1 acre per day	0	8	0
Four times of harrowing	0	4	0
Rolling once	0	1	0
Gathering and burning couch	0	1	6
Third ploughing	0	7	0
Three harrowings	0	3	0
Rolling	0	1	0
Two harrowings	0	2	0
Couching	0	1	0
Fourth ploughing	0	7	0
Harrowing and rolling	0	3	0
Couching, &c., last time	0	1	0
	£2	9	6

that *2l.* of this outlay may be struck off when the practice of forking out the couch-grass before ploughing the wheat-stubble is generally adopted, by which means, according to Mr. Bond, the greater portion of the fallow will need only to be ploughed once, as a preparation for the wheat crop. Mr. Pusey concludes by expressing a hope that such a bill as that cited from Bayldon may be read as a curiosity in after years.

Mr. Morton also writes in the 'Journal of the Bath and West of England Society,' 1861, vol. ix. part 2, p. 218:—"The use of the cultivator with the occasional employment of the plough, instead of the use of the plough with the occasional employment of the cultivator, is now, and as a lesson of recent agricultural experience, generally admitted to be the most economical way to the attainment of tilth. On clay land especially, as already said, a single ploughing before winter is almost all that such land should receive throughout the year. Spring work should, if possible, be confined to the use of implements which stir the furrow-slice, and the seed-bed should be prepared upon the winter-weathered surface. No other surface, turned up by a spring-ploughing, can be generally reduced so easily or perfectly by the roller and the harrow."

When it is considered how nearly determinate most of the outgoings on a farm now are, we cannot doubt but that the attention of thoughtful men is specially directed to those few items which admit of considerable variation, amongst which the cost of the fallow surely holds a foremost place, involving, as it does, an outlay which may seriously affect the question of profit or loss.

In theory it can hardly be disputed that a single inversion of the soil, the retaining that same surface at seed-time which felt the winter's frost, is the best management; practically we have to reconcile this aim with the requirements of different soils and climates for the destruction of weeds of different habits of growth.

Under most circumstances, when the right moment can be freely chosen, skill and energy, if combined with some mechanical ingenuity, will probably solve the problem; but it is not easy thus to seize the exact moment for every spot on the farm, whilst some weeds there are which, while dormant, are tortured in vain, and when enlivened by the progress of spring do not much regard the mere combing of the cultivator or the scratching of the harrow. For such foes extermination is no doubt the proper remedy, but, like certain tribes of men whose extinction has been decreed by high authorities, the race is stubborn, and, if scotched, reappears whenever it gets an opening. Nevertheless, as the two poles of profitable farming are now, increased receipts from stock on the one hand, and decreased outlay from economical cultivation on the other, it is of the highest importance that every man should do his utmost to approach as nearly as possible to the theory of perfection, viz., single inversion of the soil.

To this end it is important that those interested in the question should confer and compare notes, and no better means to this end can be suggested, than that the local societies which are in the habit of offering prizes for the best fields of roots, should, for a while, restrict their award to the best and cleanest field *grown with a single inversion of the soil;* competitors generally, and the prizeman in particular, being called upon to state the processes of .cultivation employed, their cost, their date, and also the implements employed and the chief weeds eradicated.

If a prize were likewise given for the best communication containing a record of failure, with explanations of the causes to which that failure was assignable, it would perhaps contribute as much to the advancement of agriculture as those awarded to successful merit.

Under the second head it may be affirmed that a custom which empowers the outgoing tenant to perform acts of tillage otherwise than as directed by the landlord or his delegate, and to charge at a rate which leaves a profit, is a part of tenant-right which has hardly a redeeming feature, and acts prejudicially on the recognition of other allowances which may more justly claim to be made for mutual benefit; although its abolition must be attended with this limitation—that the tenant must be empowered to proceed according to the custom of the country, if not otherwise instructed in due time.

Where allowances are made for manures purchased, or rich feeding stuffs consumed in preceding years, the allowance, even if somewhat in excess of the benefit realized, or liable to abuse, tends to keep the soil at that artificial pitch of fertility, which is found to give the best economical results, and from which it is never depressed without far greater subsequent loss to the man on whom the restorative process devolves, than immediate gain to him who perhaps feels that he is only extracting what he himself had deposited.

The object of maintaining land constantly in a clean state by tillage is probably of equal importance with the preceding, but the machinery at present in use to secure this end is at best very imperfect, and, under the form here considered, has no influence in checking that supineness to which the withdrawal of the stimulus of self-interest naturally leads, but is merely a clumsy stopgap to prevent an utter standstill. In this, as in other respects, the prospect of change will tell unfavourably on the management during several years preceding the termination of a tenancy, but the shift of land which will be in fallow in the last year will probably be that which will have been least subject to this influence, especially under the four-course rotation.

The fallow break therefore is not that part of the farm to the clean state of which our attention should be especially directed, if we would obviate or mitigate the evils arising from change, but rather those fields which were fallowed in the immediately preceding years. But even supposing that it were the most important object of attention, what would be the dictates of a sound policy with regard to it? Assuredly not that which would lead to an extra amount of tillage, even if requisite and judicious, becoming a source of extra profit to the man through whose negligence it has become necessary; but rather that the allowances made for the maintenance of a fair state of cleanliness should be replaced by penalties on foulness, or, if that view of the subject be visionary, at least that the allowances made should be so barely remunerative as to constitute a somewhat onerous obligation rather than a source of gain.

At the very least the rate of charge for tillages allowed to the outgoing tenant ought to be calculated on the basis of mutual accommodation, not that which leaves a margin for trade profit. That this charge has been so generally calculated, few I think will venture to affirm; to what extent it should be taxed is a question that can only be solved by a large mass of evidence from the well-kept account-books of skilful managers. On this and many other points we have had too much theorizing, and that of the worst kind, as coming from men who were theorizing unconsciously. Some, too, of our standard books laboured under this difficulty—that the author had to justify a foregone conclusion; he was a valuer of long-established business and reputation; his new calculations could not much diverge from his former awards without seriously damaging his position; and yet causes such as improvements in implements, drainage, free circulation of air, and in management, were in slow but constant operation, tending to an improved economy in labour, such as to call for a revision of the tariff in our day, if not within a shorter period.

If we may be called upon to account for the origin of unsatisfactory arrangements for the performance of acts of cultivation under a change of tenancy, the answer will not be difficult. Estate management was more in its infancy a few years back than farming, and few functions were more inadequately performed, or salaries more easily earned, than those of the old-fashioned estate-agent. He probably had not that practical knowledge of agriculture which would enable him to give even general directions for the course of tillage to be adopted. His visits were too short and far between to enable him to exercise any supervision; and he was often too remiss to have even found a new tenant who would watch over his own interest, until the eleventh hour. Besides, if the old tenant went out very much in arrear, with much diminished crops, these allowances found their way practically into the landlord's pocket to cover the deficit, and it was convenient that their amount should be considerable.

These remarks have been naturally suggested by the question of the capital required for taking a farm. It is against the public interest, as well as against agricultural progress, that these requirements should be excessive. When all superfluities have been removed, if improved farming is to be carried out, a sum will still be required considerably larger than was anywhere employed in bygone times, or than our inferior districts can now readily command.

The farmer has replaced the yeoman, simply because when a man puts his brains and his time as well as his money into an occupation, it is profitable to make the area of that business as large as is compatible with good management; and these advantages are so great as to outweigh those arising from the superior control, which is *a necessary attribute* of ownership. Sound economy suggests that this subdivision between the owner or capitalist, and tenant or trader, should be carried out as far as is convenient; that the latter should not employ his means, which in connection with his attention are worth to him 10 per cent., where those procurable by the capitalist at 4 per cent are available; and, on the other hand, that the former should not make any outlay that implies partnership in trade. Admitting these general principles, questions will practically arise whether, primarily at least, the work of some abiding improvements should not be effected by the tenant, when farm-labour enters largely into their cost, in consequence of his superior command and control over such agencies. The work of marling and liming, and, if there be skill on the one side and confidence on the other, the cutting of drains, are cases in point; on the principles above stated the cost of draining should fall upon the owner, where, as in most cases, it is an indisputable benefit; that of liming or marling *might* likewise do so, unless its advantage be so far questionable as to imply partnership in a doubtful enterprise.

The Essay before us is certainly defective in one respect; viz. in assuming that an adequate supply of manure will be found on the farm by the incoming tenant without cost to himself. This is surely Utopian! In fact the new tenant may either find manure composed of ground straw and water with a little horse-dung, free of charge,—and then he will have a supplementary bill for artificial manures; or a somewhat better manure (but of what precise quality and worth it will be hard to determine), to be taken at a valuation; or else some good bullock-dung, coupled with a bill, which he cannot very well tax, for percentages on feeding-stuffs consumed by his predecessor.

The alternatives are none of them very satisfactory: the second being probably the least so, as most matter of guess-work; the first perhaps least riskful to the individual, if the land has a good staple, so as to bear for a while the forcing of artificials; the latter decidedly for the public weal as maintaining the fertility of the soil, and therefore to be adopted, if it can be done with proper security for the interests of both parties concerned. One practical difficulty will be, that oilcake, &c. supplied in scanty allowances to growing stock will not leave as rich a residuum as if given largely to old fat beasts. Any *covenanted* allowance therefore should be moderate, if not low, whereas in practice it seems either not to be recognized at all, or else very highly estimated.

There is another item not included in this estimate, which is often of much importance in a farm valuation—that of the allowance for straw.

Whenever the sale of this article is not specifically authorized under definite conditions, it is important that any allowance made under this head, whether on account of its value as food for off-stock, or in default of the fulfilment of some obligation to thresh and carry out corn, should not creep up into exaggerated proportions.

Where custom only is the rule, the area to which such custom applies is necessarily ill defined; at different centres clearly opposite customs prevail; between them may lie much border or debatable ground, or ground which the ingenuity of lawyers may make appear such. When there is any really intricate conflict of custom, so much of technicality is involved that a town attorney has a difficulty in preparing the brief, a purely legal advocate in eliciting the facts, the judge in seeing the bearings, and the jury, especially a town jury, in deciding on the merits of the case. The bias will probably be in favour of the claim for enlarged compensation; the lawyer probably thinking that he who has *a* right has a *full* right; the middle-class juryman readily adopting a view which is apparently favourable to *one*, and not so obviously at the cost of *another* member of his own class; and thus the capital required for stocking a farm may be increased to the injury of the community at large, but especially that of estates in the neighbourhood, for in this, if in any case, "tua res agitur paries cùm proximus ardet."

These remarks are intended rather to call attention to sound principles than to suggest special courses of action. In some neighbourhoods very great practical difficulties may exist in the way of their being carried out, but at least, if the principles be recognized as sound, adverse customs will not be allowed to spread if they exist, or to be introduced if they have not yet got hold. England always deals very tenderly with vested interests, and is wise and far-sighted in so doing. In the matter before us the only vested rights at all in conflict with the public good are those of tenants in possession; this interest is by no means identical with that of the most enterprising and successful class of farmers, who, for themselves or their belongings, are quite as much takers, as holders of farms. It is against the takers of farms that these rights most militate, the landlord occupying almost a neutral position between the two parties.

On the other side, if there are rights not established, which might on the whole conduce to agricultural wealth, and so benefit the public, this is partly on account of the risks they involve; the difficulty of adjusting the terms arising from our imperfect knowledge; the exaggerated form which these rights sometimes assume, and some apprehension of that strong English leaning, of which we have just observed the favourable side, to sanction the growth even to excess of any usage based on a concession.—P. H. FRERE.

XI.—*Fifth Report of Experiments on the Feeding of Sheep.* By J. B. LAWES, F.R.S., F.C.S., and DR. J. H. GILBERT, F.R.S., F.C.S.

IN several Reports in this Journal on the Comparative Fattening Qualities of different Breeds of Sheep*—Hampshire and Sussex Downs, Cotswolds, Leicesters, Cross-bred Wethers, and Cross-bred Ewes—we have given the particulars of the feeding, with good fattening food, and under cover, of forty or more of each of the descriptions mentioned, from the age of nine or ten to that of fifteen or sixteen months. When fattened up to this point, about two-fifths of each lot were sold alive; about two-fifths were slaughtered and sold dead, and the particulars obtained relating to the quantity of the meat produced under the system of early and rapid fattening were recorded. The remaining animals were removed from the shed to the open field, and fed till Christmas, that is, for some seven or eight months longer. It is the results of the feeding of these few sheep from the *moderately fat* to the *very*

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* 'Journal of the Royal Agricultural Society of England,' vol. xii., Part 2; vol. xiii., Part 1; and vol. xvi., Part 1.

fat condition which form the subject of the present short communication.

There were thus further fattened—

8 Hampshire Downs,
8 Sussex Downs,
6 Cotswolds,
8 Leicesters,
8 Cross-bred Wethers (Leicester ram and Southdown ewe),
8 Cross-bred Ewes (Leicester ram and Southdown ewe).

During what may be called the *first period* of feeding, that is, from November or December, when the sheep were nine or ten months old, to the following April or May, when they were fifteen or sixteen months old, and *moderately fat*, they received, under cover, a liberal daily allowance (according to their weight) of oilcake and clover-chaff, and also as many roots as they chose to eat, the amount of which was weighed. During the *second period* of feeding (to which the present Report specially refers) the reserved lots above enumerated received from April or May up to the following Christmas, in the field, the same amount of oilcake * in proportion to their weight as formerly, and, in addition, hay-chaff and roots at the commencement of the period; then green clover or grass during the three summer months, from the early part or middle of June to the early part or middle of September; and then again, hay-chaff and roots, up to the termination of the experiment.

After a few general observations on the progress made in this second period, we propose to call attention to the comparative amounts of food consumed, and to its comparative productiveness, during the "first" and "second" periods respectively—that is, from the *store* to the *moderately fat* condition in the one case, and from the *moderately fat* to the *very fat* in the other.

The sheep were weighed monthly; and it was found that every one of the lots, in fact almost every animal of these previously house-fed and moderately fat sheep, lost weight, more or less, under the exposure to the heat and drought of summer, when feeding in the field upon clover or grass, notwithstanding that they had at the same time a fair allowance of oilcake also.

The Hampshire and Sussex Downs were fed through the summer and autumn of 1851. From May 8 to June 19 they had, besides oilcake, hay-chaff and roots. From June 19 they were turned for three months upon green clover. During the first month of the three the weather was very hot, and there was less than the average fall of rain. Both lots lost weight, the Hampshires losing the most. In the second month, with comparatively moderate height and range of temperature, but still little rain, the Hampshires gained pretty well, but the Sussex sheep still lost a little. In the third month, which was not hot, but continued dry, both lots lost again. The result was that, over the whole three months during which the sheep were fed upon green clover, as much as they chose to eat, with oilcake in addition, the eight Hampshires only gained 6 lbs., whilst the eight Sussex sheep taken together lost 22 lbs.

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* The Cotswolds had lentils instead of oilcake during a considerable portion of the "second" period of feeding.

The Cotswolds were fed through the summer and autumn of 1852. From April 17 to June 14 they received, besides oilcake (or lentils), hay-chaff and roots. On June 14 they were put upon grass and were kept upon it for three months, having the usual allowance, according to their weight, of oilcake (or lentils) in addition. During the first of these three months the temperature was more moderate, both in height and range, and the fall of rain was rather higher, than in the corresponding month of 1851. Still the sheep lost considerably. During the next two months the temperature was generally higher than in the other years of experiment, but the fall of rain was considerable; and during these two months the 6 Cotswolds so far regained as to reduce the loss of weight over the three months to 7 lbs. on the lot of sheep. In the next succeeding two months every one of the 6 sheep gained very considerably.

It was during the summer and autumn of 1853 that the Leicesters, and the two lots of cross-breds, were turned out. They had oilcake, hay-chaff, and roots, from April 21 to June 7. For two months from June 7 they were fed upon grass, and then for about six weeks upon green clover, with oilcake, as usual. During the first month upon grass, commencing June 7, both the height and range of temperature were lower, and the fall of rain was larger, than during the corresponding period of the two preceding years. Still the Leicesters lost a little, and the cross-breds gained but little. In the next month the temperature was comparatively low, but the fall of rain was very large, and all three lots lost weight more or less—the cross-bred wethers losing the most. During the next or third month, with only moderate height and range of temperature, but with very little rain succeeding the previous heavy fall, all three lots regained considerably. The result was that, taking the whole of the three summer months of 1853, during which the temperature was generally much lower, and the fall of rain more liberal, than in the two other seasons, the Leicesters and cross-breds gave a very much better rate of increase than did either the Hampshire or Sussex sheep during the corresponding summer months of 1851, or the Cotswolds during those of 1852.

It is obvious from the facts just stated, that high temperature and drought on the one hand, and an excessive fall of rain on the other, were injurious to the progress of the animals. The result points to the desirableness of shelter, not only from the more inclement weather of winter, but from the heat or excessive rains of summer also. It will presently be seen, how very large was the amount of food required to produce a given amount of increase under the circumstances described. Comparing, however, the progress of these six lots of sheep, when turned out during the summer, after having been liberally fed, under cover, up to a given point of fatness, with that of a few of several of the lots which were fed in the field *the whole year through*, the result was, that the latter did very much better than the former through the summer months, and onwards unto the time of killing; so that, over the *entire year*, they gave nearly the same amounts of increase, in proportion to their weight, as those which had been the first half of the time under cover; although, during the exposure of the previous winter they had increased much less rapidly, whilst their consumption of food was doubtless greater.

It is not proposed to enter into the same numerical details in regard to these few excessively fattened sheep, as it was thought desirable to do in the reports of their feeding up to a moderate and more practically useful degree of fatness. The results are already calculated and tabulated for our own reference; but it is thought that the few general observations made above, as the result of a study of the details, will probably serve every useful purpose, whilst they will occupy much less space.

The amounts of food consumed, and of increase yielded, &c., during the "first" and "second" periods of feeding respectively, are recorded in Tables I., II., and III.

Table I. gives, for each description of sheep, and for each period, the amount of fresh food consumed per head, per week; and both the fresh food, and the dry substance of the food (that is, excluding the moisture it contained) consumed per 100 lbs. live weight, per week.

Table II. gives, in like manner, the amounts of fresh food, and dry substance of the food, consumed to produce 100 lbs. increase in live weight.

Table III., again, shows the average weight per head, at the commencement, and at the conclusion of the experiment; the average increase per head per week; the average increase per 100 lbs. live-weight, per week; the average weight of carcass per head; and the proportion of carcass, and of some of the internal parts, in 100 of live weight.

TABLE I.

Showing the Average Consumption of Food per Week, per Head, and per 100 lbs. Live-weight, during the 1st and 2nd Periods of Fattening.

DESCRIPTION OF SHEEP.	Fresh Food consumed per Head, per Week.						Consumed per 100 lbs Live-weight per Week.													
							Fresh Food						Dry Substance of Food.							
	Oilcake.		Hay-chaff.		Roots.		Oilcake		Hay-chaff		Roots.		Oilcake.		Hay-chaff.		Roots		Total.	
	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.
	lbs. ozs.	lbs. ozs	lbs ozs.	lbs. ozs.	lbs. ozs.	lbs. ozs	lbs ozs.	lbs ozs	lbs ozs	lbs. ozs	lbs ozs	lbs ozs	lbs	lbs	lbs.	lbs	lbs.	lbs.	lbs.	lbs.
Hampshire Downs	7 12¼	11 0¼	7 0	4 6¼	106 3¼	121 6	5 4½	5 5¼	4 11¼	2 2¼	71 10¼	58 11¼	4·61	4·64	3·53	1·75	7·21	7·66	15·65	14·05
Sussex Downs . .	6 0½	8 3¾	5 12¼	3 15	77 12¼	97 6	5 4¼	5 5¼	5 0¼	2 8¾	68 0¼	63 0	4·61	4·64	4·10	2·08	6·85	8·22	15·56	14·94
Cotswolds . . .	8 1	11 8¼*	6 14½	7 0	113 4	128 6¼	5 3¼	5 8¼*	4 7¼	3 5¼	73 6¾	61 6¾	4·58	4·66*	3·74	2·74	8·36	8·01	16·68	15·61*
Leicesters	5 14	7 15½	5 9¼	6 3¾	83 13	130 14¾	4 12	4 14	4 8¼	3 13	67 13	80 4½	4·10	4·25	3·64	3·13	7·72	7·81	15·46	15·19
Cross-bred Wethers	5 14	8 1	5 9¼	6 8¼	82 14	128 9¼	5 0	5 1¼	4 12¼	4 0¼	70 10	81 1	4·32	4·44	3·83	3·29	8·04	7·92	16·19	15·65
Cross-bred Ewes .	5 9¼	8 1	5 5	6 8¼	78 0	125 4	4 15½	5 3¼	4 11¼	4 2	69 5½	81 5¾	4·29	4·56	3·79	3·37	7·89	7·91	15·97	15·64

* The Cotswolds had lentils instead of oilcake during a considerable portion of Period 2.

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TABLE II.

Showing the Comparative Productiveness of the Food in Animal Increase, during the 1st and 2nd Periods of Fattening.

DESCRIPTION OF SHEEP.	Consumed to Produce 100 lbs. Increase in Live-weight.															
	Fresh Food.								Dry Substance of Food.							
	Oilcake.		Hay-chaff		Roots		Total.		Oilcake.		Hay-chaff		Roots.		Total.	
	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1.	Period 2.
	lbs	lbs	lbs.	lbs.	lbs.	lbs	lbs	lbs	lbs	lbs.	lbs.	lbs	lbs	lbs.	lbs.	lbs.
Hampshire Downs . .	292	576	261	231	3967	6350	4520	7157	255	502	212	189	399	828	866	1519
Sussex Downs .	297	546	285	261	3836	6451	4418	7258	260	476	232	214	386	842	878	1532
Cotswolds	274	556*	217	337	3538	6190	4029	7083	222	488*	181	276	405	807	808	1571*
Leicesters	264	478	251	375	3761	7877	4276	8730	228	417	202	307	428	767	858	1491
Cross-bred Wethers .	264	479	252	378	3725	7625	4241	8482	228	417	202	309	424	745	854	1471
Cross bred Ewes .	264	495	250	390	3671	7693	4185	8578	227	431	201	319	418	748	846	1498

* The Cotswolds had lentils instead of oilcake during a considerable portion of Period 2.

TABLE III.

Live and Dead Weights of the Sheep, &c.

DESCRIPTION OF SHEEP	Average Weights, per Head.				Average Increase, per Week				Average Weight of Carcass per Head (weighed cold)		Per Cent Carcass in Unfasted Weight.		Per Cent. in Fasted Weight.					
	At Commencement of the Feeding Experiment.		At Conclusion of the Feeding Experiment.		Per Head.		Per 100 lbs. Live-weight.						Carcass.		Loose or Inside Fat.		Lungs (with Wind-pipe).	
	Period 1.	Period 2.	Period 1. Moderately Fat	Period 2. Very Fat.	Period 1.	Period 2.	Period 1.	Period 2.	Period 1. Moderately Fat.	Period 2. Very Fat	Period 1. Moderately Fat.	Period 2. Very Fat.	Period 1. Moderately Fat.	Period 2. Very Fat.	Period 1. Moderately Fat.	Period 2. Very Fat.	Period 1. Moderately Fat	Period 2. Very Fat.
	lbs.	lbs.	lbs.	lbs	lbs. ozs	lbs. ozs.	lbs. ozs.	lbs ozs.	lbs.	lbs.								
Hampshire Downs . . .	113¾	176½	176¾	237	2 10¾	1 14½	1 12¾	0 14¾	102	141¾	56·7	59 8	60 6	62 6	7 09	9 06	0 93	0·79
Sussex Downs	88	130¾	135	178¼	2 0¼	1 8	1 12½	0 15½	76¾	105¾	57·0	59·3	60·6	62 5	7·29	9 04	1 00	0 89
Cotswolds	119¾	172½	174	245½	3 2¾	2 1½	2 1	0 15¾	101	148¾	58 0	60·7	61 4	63 1	5·18	5·27	1·09	0·82
Leicesters	101½	134½	137¾	192	2 3¼	1 10¼	1 12¾	1 0½	76½	116¼	54 7	59 8	60·1	63 7	4·60	5·81	1·10	0·84
Cross-bred Wethers. . .	95	130	133½	186½	2 3¼	1 9¾	1 14¼	1 0¼	74	112¾	55·3	60·3	60 5	64 0	5·35	6·59	1 09	0·82
Cross-bred Ewes. . . .	91½	125¾	126¼	182	2 2	1 10	1 14	1 0¾	70	109	55 2	60 0	60·9	63 4	5 79	6·93	1 02	0·83

With regard to the estimates given in the Tables of the amounts of food consumed during "Period 2," some explanations are necessary. As already stated, the sheep had, during about three months out of the seven or eight of the whole period, green clover or grass in the field, the amount of which was not weighed; and it was only when they had not such green food that they were supplied with hay-chaff and roots. Whenever they had hay-chaff, which was during nearly five months out of the seven or eight, the quantity consumed was weighed. They had roots for the same time as hay-chaff; and in the cases of the Leicesters and cross-breds, these were weighed during the whole four or five months; but in the cases of the Hampshires, Sussex, and Cotswolds, the roots were only weighed during two months out of the four or five that they were employed. The oil-cake (or lentils) was, however, weighed in every case throughout the whole period of feeding. There is no difficulty, therefore, in calculating the amount of oil-cake consumed by the animal in relation to a given live-weight, or to produce a given amount of increase, during the whole seven or eight months of the feeding experiment. With regard to the hay-chaff and roots, the average rate of consumption is taken only over the period in which each was actually consumed. And in the estimates given in Table II. of the amounts of fresh food, or dry substance of food, consumed to produce 100 lbs., increase in live-weight, it is assumed, for the purpose of comparison with the *first* period of feeding, that the green clover or grass eaten in the summer months, was equivalent to the hay-chaff and roots consumed when these were the foods employed. That is to say, in the Table, the green clover or grass is reckoned as hay-chaff and roots, in amount bearing the same proportion to the oil-cake as did the hay-chaff and roots, when these were actually consumed. The figures given in Tables I. and II. for the hay-chaff and roots of "Period 2" must, therefore, be taken as only approximate estimates. They will probably be slightly too high, but they are undoubtedly quite near enough for the purpose of comparing, on the points in question, the results of the *second* period of feeding with those of the *first.*

In Table I., the first division shows that the amount of oil-cake consumed per head per week was in all cases considerably greater during the second period than the first. The estimated consumption per *head* per week of hay-chaff was also in most of the cases rather more, though in some less, in the second period; and that of the roots was always greater in the second period than in the first.

The second division, which gives the amounts of the several foods consumed *per* 100 *lbs. live-weight* per week, shows that, as was intended, the amount of oil-cake consumed by *a given weight of animal within a given time* was almost identical for the two periods; the estimated amount of hay-chaff was, however, always less, and that of the roots in some cases less, and in others more, in the second period than in the first.

But it is in the third division of this Table, which shows the *dry substance of the foods consumed per* 100 *lbs. live-weight per week*, that we have the best comparison afforded between the rate of consumption during the earlier and the later periods of fattening. The figures in the last two columns show that, with every one of the descriptions of sheep, the average proportion consumed was rather less during the second period; that is to say, as the animals became fatter. The difference is, however, but small; nor can the whole of it be taken as representing so much less of real assimilable or respirable matter. The lessened consumption of dry substance in the second period is chiefly in the *hay*, which contains a much larger proportion of indigestible woody-fibre than either of the other descriptions of food; whilst the consumption of the dry matter of oil-cake, which would have a higher respiratory and nutritive capacity than that of either of the other foods, was always equal, and sometimes greater, in the second period than the first.

So far then as we may judge of the rate of consumption during the whole of the extra-fattening period from the results obtained when the foods were actually weighed, there is but little evidence of a lessened rate of consumption in relation to the weights of the animals as they matured. It is very probable, however, that during the hot season, when the sheep were feeding upon green clover or grass, their rate of consumption was in reality rather below, instead of, as we have assumed it, equal to, that of the other portions of the time. If so, this would somewhat reduce the average consumption over the whole period, and the average would then undoubtedly be somewhat lower for the second period than for the first. The evidence must be taken as, upon the whole, in favour of the conclusion that it was so.

In the case of pigs, it is found that the consumption in proportion to the weight of the animal decreases very considerably as it fattens. But the dry substance of the food of the pig contains a much larger proportion of assimilable and respirable matter, and a much less proportion of indigestible woody-fibre, than does that of the sheep. The pig, too, consumes a much larger amount of dry substance of food, in relation to its weight within a given time, and gives also a much larger amount of increase for a given amount of dry substance consumed. We should not expect, therefore, to find so marked a diminution in the rate of consumption of the fattening sheep, as in that of the fattening pig. Still, the diminution indicated by the approximate estimates given in the Table is less than we should have anticipated.

It will presently be seen too, that, at least in these particular experiments, the amount of increase obtained for a given amount of food consumed was much less during the second than during the first period of fattening. Even with pigs, it was found that there was a slight tendency to give a less amount of *gross* increase for a given amount of food consumed as the animal matured. This diminution was, however, in their case probably compensated for by the increased proportion of real dry or solid substance in the increase as they matured. Sheep also doubtless give a somewhat less aqueous increase as they fatten. But at any rate in these particular experiments, in which the animals lost weight during a part of the later period of feeding, there was then, compared with the earlier one, far too great a diminution in the proportion of *gross* increase to food consumed, to be compensated for by the slightly greater proportion of dry substance which that increase would contain.*

That the amount of food consumed to a given live-weight should decrease as the animal matures, might be expected from the lessened proportion which the respiratory system will bear to the entire body the more the *carcass* increases and fattens. But, independently of this, it would be anticipated that the demands of the respiratory system would be less during the warmer months of Period 2; though, during the whole of Period 1 the animals were under cover, and, therefore, protected from inclement weather.

We come now to a more direct consideration of the comparative *productiveness* of the food in the *first* and *second* periods of fattening, as illustrated by the approximate estimates given in Table II.

It appears that, in the case of every one of the six descriptions of sheep, there was nearly twice as much oil-cake; in four out of the six considerably more hay-chaff, or its equivalent; and in all cases much more, and in several more than twice as much, roots; or, as shown in the two last columns, generally about 1¾ times as much dry substance of the mixed food, required to produce 100 lbs. of increase during the later than during the earlier period of feeding.

It is not supposed that, under favourable circumstances, the productiveness of a given amount of food will diminish so rapidly with the progress of the animal from the fat to the very fat condition as in the instances here under consideration. Still, the results of these experiments afford a striking illustration of the heavy loss that may arise when animals are, from any cause, allowed to lose weight, especially after they have been once brought into a condition fit for the butcher. It is obvious, too, that they may lose under the most liberal system of feeding, if their comfort in other respects be not duly provided for. It is true that the sheep kept out of doors all the year round, did not suffer during the summer months so much as those which had been under cover during the previous winter, and were already riper when turned out. In fact, though the more hardily treated sheep increased very much less during the winter months, over the whole year they increased nearly as much as those which had been housed during nearly the first half of the time, and had then increased so rapidly. But doubtless the nearly equal total increase of the entirely field-fed sheep was, as already observed, obtained at the expense of a much larger proportional consumption of food during the exposure of the early part of their feeding.

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* For estimates of the character and composition of the increase during different periods of fattening, the reader is referred to our Report in the last number of this Journal, vol. xxi., part 2.

This comparison of the results of experiments on the excessive fattening of sheep—whether for the most part housed, or fed in the field throughout—with those obtained when they are only moderately fattened, clearly points to the great economy of food attained by adopting a system of *early and rapid fattening.*

In the second main division of Table III., which shows the average increase per week, both per head, and per 100 lbs. live-weight, irrespectively of the amounts of food consumed, we have again strikingly brought to view the great difference in the rate of progress of the animals during the two periods of feeding. Notwithstanding the much greater weights of the sheep during the second period, not one of the lots gave so much increase *per head* per week then, as during the earlier period; and calculated in relation to 100 lbs. live-weight, instead of per head, it was, in every case, only about half as much in the later stage of feeding.

Table III. shows, however, that these extra-fattened sheep gave the greater proportion of carcass to live weight; and, that the condition of their carcasses was such as is more valued at the Christmas markets than that of the more moderately-fed animals, is freely granted. But the practical question arises—Is the extra price obtained equivalent to what will frequently be the extra cost of production? We think certainly not.

The following table shows the average weights of the carcasses of the different lots, both in the moderately fat, and in the very fat condition, reckoned both in stones of 8 lbs., and in lbs. per quarter:—

TABLE IV.

	Carcass, in Stones of 8 lbs.				Carcass, in lbs. per Quarter.	
	Moderately Fat.		Very Fat		Moderately Fat.	Very Fat.
	stones.	lbs.	stones	lbs.	lbs.	lbs.
Hampshire Downs	12	6	17	6	25½	35½
Sussex Downs	9	5	13	2	19¼	26½
Cotswolds	12	5	18	5	25¼	37¼
Leicesters	9	4	14	4	19	29
Cross-bred wethers	9	2	14	0	18½	28
Cross-bred ewes	8	6	13	5	17½	27¼

The above weights of the meat yielded by the "moderately-fat" sheep, at an age of fifteen or sixteen months, are equal to those formerly obtained at twice the age, or more; and they are satisfactory examples of what may be attained under the modern system of feeding, adapted to the production of mutton on a large scale. It may be doubted, indeed, whether equal weights and fatness can be attained at an earlier age, or greater weights and fatness at so early an age, without a sacrifice of quality. In fact, although it is only by a system of early and rapid fattening that sufficient meat can be produced for the masses of the population, it must be admitted that mutton thus early matured does not so well satisfy the limited demand of the connoisseur as that which is less artificially produced.

The weights of the "very fat" carcasses, in spite of the loss of weight of many of the animals during part of the second period, were, after all, really heavy for sheep that were two or three months short of two years old. The demand for mutton so fat as it will become at an age of more than eighteen months, under a system of early and sustained high feeding, is, however, but limited, and it is only exceptionally, and when sold at a fancy price, that it can be as profitable to the producer as that which is more moderately fattened.

The feeder should not lose sight of the fact that, so long as an animal lives, the expenditure of the constituents of food, by the respiratory process is never stopped. If it has reached the point at which the increase it yields declines in amount, or in value, in proportion to the food consumed, further increase will obviously be obtained at a larger proportional expenditure of food in the respiratory process. Or, if the animal at any time do not gain, or should lose weight, the whole of the food then consumed is (leaving out the question of the manure) expended to no other purpose than to keep the machine of the body in working order; and the whole of the food so consumed and expended, as well as that which actually yielded increase, has to be reckoned against the total increase obtained.

The last two columns of Table III. do, indeed, show that the proportion which the lungs bear to the weight of the whole body decreases considerably as it matures; that is to say, as it fattens, and the proportion of the carcass increases. But the facts relating to the amounts of food consumed, and of increase yielded, as the animal matures, are quite adverse to the supposition that there is any such progressive diminution in the expenditure by the respiratory process for a given live-weight, as can at all compensate for the lessened proportion of increase which it yields with advancing maturity.

Upon the whole, it is concluded that there is a considerable economy of food in the system of early and rapid fattening of sheep; and that, after the animals have attained a moderate degree of fatness, it will seldom be profitable, and may frequently be a loss, to the *producer*, to feed them further.

The same remarks will probably apply, *mutatis mutandis*, to oxen also.

The same rule does not apply with equal force to pigs. The dry substance of the food of pigs is, weight for weight, much more costly than that of the other animals; but, in their case, from the much larger proportion of increase they yield, both for a given amount of dry substance of food consumed, and for a given weight of the body within a given time, it results that the amount of constituents expended by the respiratory process bears a considerably less proportion to the gain in weight, than in that of either sheep or oxen. Again, their increase consists in a larger proportion of fat; and by the fatness of the meat its quality and value are to a great extent determined. On the other hand, not only do the quality and rateable value of mutton and beef reach their maximum, or nearly so, at a comparatively limited degree of fatness, but it appears that the amount of constituents expended by respiration increases more rapidly in proportion to a given weight of saleable increase as the animals progress in fatness.

XII.—*Report of Experiments on the Fattening of Oxen, at Woburn Park Farm.* By J. B. Lawes, F.R.S., F.C.S., and Dr. J. H. Gilbert, F.R.S., F.C.S.

In 1849, after we had commenced numerous experiments with sheep, and some few with oxen and pigs, with a view to determine the relations of both the meat and manure produced to the food consumed to produce them, His Grace the late Duke of Bedford kindly placed at our disposal, for the purposes of our inquiry, his numerous feeding boxes and fattening oxen. The advantages at Woburn were, the selection from, and dealing with large numbers of animals, and the facility afforded by the box system for the collection and preservation of the manure—to determine the quantity and composition of which constituted one important object of the experiments.

The results were from time to time communicated to His Grace as the experiments proceeded; but it is to be regretted that the publication of them did not take place before his lamented death. It was found, as the inquiries connected with the feeding of animals extended and ramified, and the results accumulated, that it would be necessary to arrange them for publication under three separate heads, which should be treated of somewhat in order as follows: First, those relating to the amounts of food, or its several constituents, consumed by a given weight of animal within a given time, or required to produce a given amount of increase in live-weight. Of these we have already given numerous records in this Journal so far as sheep and pigs are concerned; and in the present number we add a short report relating to sheep. It is the object of the present communication to give the results of the experiments with oxen at Woburn, so far as they relate to this first division of the subject, and thus to complete for the present, our reports on that branch of the inquiry. The second main branch of the subject is that of the composition of the animals, and of their increase whilst fattening; and on this we gave a report in the last number of the Journal, relating to all of the three descriptions of animal—oxen, sheep, and pigs. The third branch includes the question of the composition of the manure in relation to that of the food consumed; and upon this we now hope to report in an early succeeding number of the Journal.

In the conduct of the experiments at Woburn our plans were cordially seconded by Mr. Bennett; and every facility and assistance were afforded throughout their progress by Mr. G. W. Baker.

Had the object been only to determine the average amounts of food, of known composition, consumed in relation to a given weight of animal within a given time, or required to produce a given amount of increase in live-weight, it would doubtless have been desirable to continue each experiment for several months; so as to get average results unaffected by the incidental circumstances of change of food, condition of individual animals, &c. But owing to the great difficulty of dealing with the very large quantities of manure that would then be involved, eight to nine weeks was the longest period over which it was attempted to weigh, and sample carefully for analysis, the food, litter, and dung, of the animals. Hence the results relating to the amount of increase obtained for food consumed must be taken as applying only to the few final weeks of high feeding.

Six experiments were made; one with 11; one with 12; three with 5; and one with 6 animals. The numerical results are arranged in Tables as follows:—

In Tables I., II., III., IV., V., and VI., the actual weights, and gain in weight, of each animal.

In Table VII. the total quantities (both fresh and dry), of food consumed, litter used, and increase and dung obtained, in each experiment.

In Table VIII. the average amounts (both fresh and dry) of food, litter, increase, and dung, per head per week.

In Table IX. the average amounts (both fresh and dry) of food consumed, per 100 lbs. live-weight per week.

In Table X. the average amounts (both fresh and dry) of food consumed, to produce 100 lbs. increase in live weight.

In Table XI. is given a summary of the results of the feeding of oxen at Woburn, side by side with those obtained by other experimenters.

In Table XII. the average results of experiments on the feeding of oxen, are compared with similar particulars relating to sheep and pigs.

In Tables XIII. and XIV. the proportion of the dung obtained to the food consumed, and litter used.

In the brief remarks which follow attention will be chiefly confined to the amounts of food consumed in relation to a given weight of animal, and to produce a given amount of increase; but a few observations will also be made on the amounts of fresh and dry dung obtained for given amounts of fresh and dry food and litter used. The question of the *composition* of the dung, in relation to that of the food, will be considered on a future occasion.

Experiment 1 included 6 Herefords and 5 Devons; and Experiment 2, 7 Herefords and 5 Devons. The animals were taken from grass, weighed, and put into the boxes, on September 18, 1849. Those of Experiment 1 were fed upon crushed oil-cake, clover-hay chaff, and Swedish turnips; and those of Experiment 2 on a cooked mixture of 2 parts linseed-meal, 2 parts barley-meal, and 1 part bean-meal, with chaff and roots as in Experiment 1. During the first period of the experiment, from September 18 to October 17, the food, litter, and dung were not accurately weighed. On October 17, the oxen were re-weighed, and the boxes emptied; and from this date to the end of the experiments, about the middle of December, the whole of the food and litter were accurately weighed; and at the conclusion, the whole of the dung of each lot was weighed, turned over, well mixed, and re-weighed. Several samples of 100 lbs. each were then taken from the heap; to some of which acid was added to prevent the loss of ammonia. Fair average samples of all the foods, and litter, were also taken.

EXPERIMENTS on the FATTENING of OXEN, at WOBURN PARK FARM.

TABLE I.—Weights, and Gain, of each Animal of Experiment 1.

Food.—Oilcake; Clover-hay chaff; and Swedish Turnips.

Nos.	Breed.	Actual Weights, and Gain, per Head.						Gain per head, per Week.			Gain per 100 lbs Live-weight, per Week.		
		First Period. Sept. 18 to Oct. 17; 29 days.		Second Period. Herefords, Oct. 17 to Dec 13 = 57 days. Devons, Oct 17 to Dec 19 = 63 days			Total Period Herefords 86 days, Devons 92 days; Average 89 days	First Period. 29 days.	Second Period. Herefords 57 days, Devons 63 days; Average 60 days.	Total Period. Herefords 86 days; Devons 92 days; Average 89 days.	First Period. 29 days.	Second Period. Herefords 57 days; Devons 63 days; Average 60 days.	Total Period. Herefords 86 days; Devons 92 days; Average 89 days.
		Weights, Sept 18	Gain.	Weights, Oct. 17.	Weights, Dec. 13 or 19	Gain	Gain.						
		lbs.	lbs.	lbs	lbs.	lbs	lbs	lbs.	lbs	lbs.	lbs	lbs.	lbs.
1	Hereford	1634	102	1736	1792	56	158	24·6	6·9	12·9	1·46	0·39	0·75
2	,, ...	1596	..	1596	1680	84	84	0 0	10·3	6·8	0·00	0·63	0·42
3	,, ...	1624	56	1680	1764	84	140	13·5	10·3	11·4	0·82	0·60	0·67
4	,, ...	1484	84	1568	1652	84	168	20·3	10·3	13 7	1·33	0·64	0·87
5	,, .. .	1316	14	1330	1456	126	140	3 4	15·5	11·4	0·26	1·11	0·82
6	,, ...	1148	42	1190	1232	42	84	10·1	5 2	6 8	0·87	0·43	0·57
7	Devon	1372	56	1428	1470	42	98	13·5	4·7	7·5	0·97	0·32	0·52
8	,, ...	1428	140	1568	1624	56	196	33·8	6·2	14·9	2·26	0 39	0·98
9	,, ...	1372	140	1512	1638	126	266	33·8	14·0	20·2	2·34	0·89	1·34
10	,, ...	1358	126	1484	1568	84	210	30·4	9 3	16·0	2·14	0·61	1·09
11	,, ...	1232	84	1316	1400	84	168	20·3	9·3	12·8	1·59	0·69	0·97
	Totals ..	15564	844	16408	17276	868	1712	..	..	..	..	..	..
	Means ..	1415	77	1492	1571	79	156	18·5	9·2	12·3	1·27	0·60	0·82

EXPERIMENTS on the FATTENING of OXEN, at WOBURN PARK FARM.

TABLE II.—Weights, and Gain, of each Animal of Experiment 2.

Food.—Linseed-compound meal, cooked; Clover-hay chaff, and Swedish Turnips.

Nos.	Breed.	Actual Weights, and Gain, per Head						Gain per head, per Week.			Gain per 100 lbs. Live-weight, per Week.		
		First Period. Sept. 18 to Oct. 17; 29 days.		Second Period. Herefords, Oct 17 to Dec 13 = 57 days. Devons, Oct. 17 to Dec 19 = 63 days.			Total Period. Herefords 86 days, Devons 92 days; Average 89 days	First Period. 29 days.	Second Period. Herefords 57 days; Devons 63 days; Average 60 days.	Total Period. Herefords 86 days; Devons 92 days; Average 89 days.	First Period. 29 days.	Second Period. Herefords 57 days; Devons 63 days; Average 60 days.	Total Period. Herefords 86 days; Devons 92 days; Average 89 days.
		Weights, Sept. 18.	Gain.	Weights, Oct. 17.	Weights, Dec 13 or 19.	Gain.	Gain						
		lbs	lbs	lbs	lbs.	lbs.	lbs	lbs	lbs	lbs.	lbs.	lbs.	lbs.
1	Hereford	1582	56	1638	1736	98	154	13 5	12 0	12·5	0·84	0·71	0·76
2	,, ...	1540	84	1624	1736	112	196	20·3	13·8	16 0	1 28	0·82	0·97
3	,, ...	1624	112	1736	1848	112	224	27·0	13·8	18·2	1·61	0·77	1·05
4	,, ...	1330	98	1428	1512	84	182	23·7	10·3	14·8	1·72	0·70	1·04
5	,, ...	1484	126	1610	1666	56	182	30·4	6·9	14·8	1·97	0·42	0·94
6	,, ...	1302	42	1344	1512	168	210	10·1	20 6	17·1	0·77	1·44	1·21
7	,, ...	1288	28	1316	1512	196	224	6·8	24·1	18·2	0·52	1·70	1·30
8	Devon	1428	140	1568	1624	56	196	33·8	6·2	14·9	2·26	0·39	0·98
9	,, ...	1386	28	1414	1540	126	154	6·8	14·0	11·7	0·48	0·95	0·80
10	,, ...	1316	84	1400	1512	112	196	20·3	12·4	14·9	1·49	0·85	1·05
11	,, ...	1344	98	1442	1568	126	224	23·7	14·0	17·0	1·70	0·93	1·17
12	,, ...	1148	70	1218	1302	84	154	16·9	9·3	11·7	1·43	0·74	0·96
	Totals ..	16772	966	17738	19068	1330	2296	..	..	..	..	..	..
	Means ..	1398	81	1478	1589	111	191	19·4	13·0	15·0	1·35	0·84	1·01

EXPERIMENTS on the FATTENING of OXEN, at WOBURN PARK FARM.

TABLE III.—Weights, and Gain, of each Animal of Experiment 3.

Food.—Oilcake-compound meal, cooked; Clover-hay chaff; and Swedish Turnips (with absorbent).

Nos.	Breed.	Actual Weights, and Gain, per Head.			Gain per Head, per Week.	Gain per 100 lbs. Live-weight, per Week.
		Weights, January 2.	Weights, February 28.	Gain in 57 days.		
		lbs.	lbs.	lbs.	lbs.	lbs.
1	Hereford ..	1372	1512	140	17·2	1·19
2	,, ..	1344	1540	196	24·1	1·67
3	,, ..	1288	1512	224	27·5	1·97
4	,, ..	1232	1400	168	20·6	1·57
5	,, ..	1260	1372	112	13 8	1·05
	Totals ..	6496	7336	840	..	..
	Means ..	1299	1467	168	20·6	1·49

TABLE IV.— Weights, and Gain, of each Animal of Experiment 4.

Food.—Linseed-compound meal, cooked; Clover-hay chaff; and Swedish Turnips (with absorbent).

Nos.	Breed.	Actual Weights, and Gain, per Head.			Gain per Head, per Week.	Gain per 100 lbs. Live-weight, per Week.
		Weights, January 2	Weights, February 28.	Gain in 57 days.		
		lbs.	lbs.	lbs	lbs.	lbs.
1	Hereford ..	1372	1540	168	20·6	1·42
2	,, ..	1260	1400	140	17·2	1·29
3	,, ..	1288	1400	112	13·8	1·02
4	,, ..	1316	1428	112	13·8	1·00
5	,, ..	1316	1456	140	17·2	1·24
	Totals ..	6552	7224	672	..	..
	Means ..	1310	1445	134	16·5	1·20

EXPERIMENTS on the FATTENING of OXEN, at WOBURN PARK FARM.

TABLE V.—Weights, and Gain, of each Animal of Experiment 5.

Food.—Linseed-compound meal, cooked; Clover-hay chaff; and Swedish Turnips.

Nos.	Breed.	Actual Weights, and Gain, per Head.			Gain per Head, per Week.	Gain per 100 lbs. Live-weight, per Week.
		Weights, January 23.	Weights, February 28.	Gain in 36 days.		
		lbs.	lbs	lbs.	lbs.	lbs.
1	Hereford ..	1400	1428	28	5·4	0·39
2	,, ..	1316	1400	84	16·3	1·20
3	,, ..	1400	1456	56	10·9	0·76
4	,, ..	1316	1372	56	10·9	0·81
5	,, ..	1344	1428	84	16·3	1·18
6	,, ..	1288	1344	56	10·9	0·83
	Totals ..	8064	8428	364	..	..
	Means ..	1344	1405	61	11·8	0·86

TABLE VI.—Weights, and Gain, of each Animal of Experiment 6.

Food.—Oilcake-compound meal, cooked; Clover-hay chaff; and Swedish Turnips (with absorbent).

Nos.	Breed.	Actual Weights, and Gain, per Head.			Gain per Head, per Week.	Gain per 100 lbs. Live-weight, per Week.
		Weights, March 11.	Weights, April 15.	Gain in 35 days.		
		lbs.	lbs.	lbs	lbs.	lbs.
1	Hereford ..	1495	1612	117	23·4	1·51
2	,, ..	1499	1615	116	23·2	1·49
3	,, ..	1478	1584	106	21·2	1·39
4	,, ..	1384	1471	87	17·4	1·22
5	,, ..	1367	1425	58	11·6	0·83
	Totals ..	7223	7707	484	..	..
	Means ..	1445	1541	97	19·4	1·30

EXPERIMENTS on the FATTENING of OXEN, at WOBURN PARK FARM.

TABLE VII.—Total Quantities (both Fresh and Dry) of Food consumed, Litter used, and Increase and Dung produced, in each Experiment.

Exp.	PERIOD OF EXPERIMENT.		Number of Animals.	FOOD.			LITTER.		TOTALS.				
				Special Food.	Clover-hay Chaff.	Swedish Turnips.	Straw	Ab-sorbent. *	Food.	Increase	Litter.	Food and Litter.	Dung.
	In Natural State of Dryness.												
		days.			lbs	lbs	lbs.	lbs.	lbs.	lbs	lbs.	lbs.	lbs.	lbs.
1	Oct. 17 to Dec. 13-19, 1849 .	60	11	Oilcake	5,297	8,654	31,168	11,655	.	45,119	868	11.655	56,774	48,824
2	Oct. 17 to Dec 13-19, 1849 .	60	12	Linseed-compound meal, cooked. .	4,716	8,892	34,941	13,513		48,549	1330	13,513	61,062	53,715
3	Jan. 2 to Feb. 28, 1851 . .	57	5	Oilcake-compound meal, cooked.	1,402	5,622	17,434	4,788	1485	24,458	840	6,273	30,731	27,698
4	Jan. 2 to Feb 28, 1851 .	57	5	Linseed compound meal, cooked. .	1,402	5,615	17,123	4,592	1480	24,140	672	6,072	30,212	27,348
5	Jan. 23 to Feb. 28, 1851 . .	36	6	Linseed-compound meal, cooked.	1,110	3,928	14,397	3,360	.	19,435	364	3,360	22,795	17.738
6	Mar. 11 to Apr. 15, 1851 .	35	5	Oilcake-compound meal, cooked. .	877	3,386	9,052	2,387	1306	13,315	484	3,693	17,008	15,542
	Totals	(53)	44	. . .	14,804	36,097	124,115	40,295	4271	175,016	4558	44,566	218,582	190,853
	Dry Substance.												
		days.			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		lbs.	lbs.	lbs.
1	Oct. 17 to Dec. 13-19, 1849 .	60	11	Oilcake	4,700	7,254	3,466	9,930	.	15,440	..	9,930	25,370	13,596
2	Oct. 17 to Dec 13-19, 1849 .	60	12	Linseed-compound meal, cooked .	4,115	7,453	3,900	11,513	..	15,468	..	11,513	26,981	13,635
3	Jan 2 to Feb. 28, 1851 . .	57	5	Oilcake-compound meal, cooked. .	1,203	4,610	1,745	3,901	797	7,558		4,698	12,256	7,427
4	Jan. 2 to Feb. 28, 1851 . .	57	5	Linseed compound meal, cooked.	1,223	4,604	1,714	3,742	796	7,541	.	4,538	12,079	7,265
5	Jan 23 to Feb. 28, 1851 .	36	6	Linseed-compound meal, cooked.	950	3,220	1,399	2,820		5,569	.	2,820	8,389	4,794
6	Mar 11 to Apr 15, 1851 . .	35	5	Oilcake-compound meal, cooked.	753	2,746	1,027	1,966	564	4,526	..	2,550	7,076	4,778
	Totals	(53)	44	. . .	12,944	29,887	13,271	33,892	2157	56,102	.	36,049	92,151	51,495

* One part sulphuric acid, dried up with two parts sawdust.

EXPERIMENTS on the FATTENING of OXEN, at WOBURN PARK FARM.

TABLE VIII.—Food consumed, Litter used, and Increase of Dung produced, *per head per week*, in each Experiment.

Exp.	PERIOD OF EXPERIMENT.		Number of Animals.	FOOD.				LITTER.		TOTALS.			
				Special Food		Clover hay Chaff.	Swedish Turnips	Straw	Ab-sorbent. *	Food.	Increase.	Litter.	Dung.
	In Natural State of Dryness.												
		days			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	Oct. 17 to Dec. 13-19, 1849	60	11	Oilcake	56¼	91¾	331	124	..	479	9 2	124	517¾
2	Oct. 17 to Dec 13- 9, 1849	60	12	Linseed-compound meal, cooked	45½	86¾	340	131¼		472¼	12 9	131¼	522¼
3	Jan 2 to Feb 28, 1851	57	5	Oilcake-compound meal, cooked	34¾	138	429	117¾	36¼	600¼	20 6	154	680¼
4	Jan 2 to Feb. 28, 1851	57	5	Linseed compound meal, cooked	34¼	138	421	112¾	36½	593¾	16 5	149	671¾
5	Jan 23 to Feb. 28, 1851	36	6	Linseed-compound meal, cooked	36	127½	467	109	..	630¼	11 8	109	574¼
6	Mar. 11 to Apr 15, 1851	35	5	Oilcake-compound meal, cooked	35	135¼	362	95¼	52½	532¾	19·4	147¾	621¾
	Average	53	(44)		43¼	110¾	377	118¾	14½	531	13 8	133	575
	Dry Substances.												
		days.			lbs	lbs.	lbs.	lbs.	lbs.	lbs.		lbs.	lbs.
1	Oct. 17 to Dec. 13-19, 1849	60	11	Oilcake	49¾	77	37	105¼	..	168¾	..	105¼	144¼
2	Oct. 17 to Dec 13 19, 1849	60	12	Linseed-compound meal, cooked	40	72¾	38	112	..	150¼	..	112	132¼
3	Jan 2 to Feb 28, 1851	57	5	Oilcake compound meal, cooked	29¾	113½	43	95¼	19¼	185¼	..	115¼	188¾
4	Jan 2 to Feb 28, 1851	57	5	Linseed compound meal, cooked	30	113	42	92	19¼	185	..	111¼	178¾
5	Jan 23 to Feb 28, 1851	36	6	Linseed compound meal, cooked	30¾	104¼	45½	91¼		180¼	..	91¼	155¼
6	Mar. 11 to Apr. 15, 1851	35	5	Oilcake-compound meal, cooked	30	109½	41	79¼	22¼	180¾	..	102	191
	Average	53	(44)		37¾	91¼	40	99¾	7	169¼	..	106¾	156

* One part sulphuric acid, dried up with two parts sawdust.

EXPERIMENTS on the FATTENING of OXEN, at WOBURN PARK FARM.

TABLE IX.—Food consumed, *per* 100 *lbs. Live-weight per week*, in each Experiment.

Exp.	PERIOD OF EXPERIMENT.		Number of Animals	Consumed per 100 lbs. Live-weight, per week.												
				In Natural State of Dryness.									Dry Substance of Food.			
				Special Foods.			Clover-hay Chaff.		Swedish Turnips.		Total.		Special Foods.	Clover-hay Chaff.	Swedish Turnips.	Total.
		days.			lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	lbs.	lbs.	lbs.
1	Oct. 17 to Dec. 13-19, 1849	60	11	Oilcake	3	10¾	6	0	21	9	31	3¾	3·26	5·02	2·41	10·69
2	Oct. 17 to Dec. 13-19, 1849	60	12	Linseed-compound meal, cooked	2	15¼	5	10¾	22	2	30	12	2·61	4·72	2·47	9·80
3	Jan. 2 to Feb. 28, 1851	57	5	Oilcake compound meal, cooked	2	7¾	9	15½	30	15	43	6¼	2·13	8·19	3·10	13·42
4	Jan. 2 to Feb. 28, 1851	57	5	Linseed-compound meal, cooked	2	8	10	0	30	8	43	0	2·18	8·20	3·06	13·44
5	Jan. 23 to Feb. 28, 1851	36	6	Linseed-compound meal, cooked	2	9½	9	4	33	15	45	12½	2·24	7·59	3·30	13·13
6	Mar. 11 to Apr. 15, 1851	35	5	Oilcake-compound meal, cooked	2	5¼	9	1	24	4	35	10¼	2·01	7·35	2·76	12·12
	Average	53	(44)	. . .	2	14¾	7	9½	25	13	36	5¼	2·55	6·28	2·74	11·57

TABLE X.—Food consumed, *to produce* 100 *lbs. Increase in Live-weight*, in each Experiment.

Exp.	PERIOD OF EXPERIMENT.		Number of Animals.	Consumed to Produce 100 lbs Increase in Live-weight.								
				In Natural State of Dryness.					Dry Substance of Food.			
				Special Foods.		Clover-hay Chaff.	Swedish Turnips.	Total.	Special Foods.	Clover-hay Chaff.	Swedish Turnips	Total.
		days.			lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	Oct. 17 to Dec. 13-19, 1849	60	11	Oilcake	610¾	997	3591	5198¾	541	836	402	1779
2	Oct. 17 to Dec. 13-19, 1849	60	12	Linseed-compound meal, cooked	354½	668½	2627	3650	309	560	293	1162
3	Jan. 2 to Feb. 28, 1851	57	5	Oilcake compound meal, cooked	166¾	669¼	2075	2911	143	549	208	900
4	Jan. 2 to Feb. 28, 1851	57	5	Linseed compound meal, cooked	208¾	835¼	2548	3592	182	685	255	1122
5	Jan. 23 to Feb. 28, 1851	36	6	Linseed-compound meal, cooked	304¾	1079	3955	5338¾	261	885	384	1530
6	Mar. 11 to Apr. 15, 1851	35	5	Oilcake compound meal, cooked	181½	699¼	1870	2750¾	156	567	212	935
	Average	53	(44)	. . .	354	829¼	2891	4074¼	310	687	309	1306

The right hand columns in Tables I. and II., giving the gain per head per week, and per 100 lbs. live-weight per week, of each bullock, show, that almost every animal of both the lots gained much more rapidly during the first than during the succeeding two months after being put on fattening food. This shows how important it is not to place too much confidence, as the basis of average estimates, on results obtained over short periods of time immediately after considerable changes in the mode of feeding. The rate of increase over the whole three months of final fattening, doubtless gives the fairest average. But as the foods, litter, and dung, were only weighed during the concluding two months, it will be necessary, in comparing the results of these experiments with those of the others, to reckon the amounts of increase and manure obtained, for given amounts of food and litter used, only over that concluding period.

The relation of the increase obtained to the food consumed, will be considered more in detail further on. But before passing to a description of the food, and of the progress of the oxen, in the other experiments, attention should be called to the fact that, over both periods, the oxen of Experiment 2, fed upon the cooked linseed-compound, increased considerably more in relation to their weight within a given time, than those of Experiment 1, having uncooked crushed oilcake. In two out of the four subsequent experiments oilcake was again used; but it was now mixed with barley and bean-meal, and the compound cooked; and thus the oilcake was more fairly tried against the cooked linseed-compound used in the other two of the experiments.

Experiments 3, 4, 5, and 6, were made early in 1851; all with Herefords, that had been already some little time feeding in stalls, on cooked linseed-compound, clover-hay chaff, and roots. The exact arrangement was as follows:—

Experiment 3, with 5 Herefords; from January 2, 1851, to February 28 = 57 days. Food—cooked oilcake-compound meal (equal weights oilcake, barley, and beans); with clover-hay chaff, and swedes.

Experiment 4, with 5 Herefords; from January 2, 1851, to February 28 = 57 days. Food—cooked linseed-compound meal (equal weights of linseed, barley, and bean meal); with clover-hay chaff and swedes.

Experiment 5, with 6 Herefords; from January 23, 1851, to February 28 = 36 days. Food—cooked "linseed-compound meal;" with clover-hay chaff, and swedes.

Experiment 6, with 5 Herefords, from March 11, 1851, to April 15 = 35 days. Food—cooked "oilcake-compound meal;" with clover-hay chaff, and swedes.

In Experiment 5, with cooked linseed-compound, straw only was used as litter, as in Experiments 1 and 2; and the manure was allowed to accumulate under the animal in the usual way, without any foreign admixture. But in Experiments 3 and 6, with cooked oilcake-compound, and 4 with cooked linseed-compound, it was sought to prevent any loss of ammonia that might otherwise take place during the accumulation of the manure in the boxes. To this end a small quantity of a mixture of 1 part sulphuric acid dried up with 2 parts sawdust, was daily sprinkled over the manure in the boxes, just before spreading the fresh litter. This mixture will, for convenience, be called *absorbent*.

Comparing the gain per head, and per 100 lbs. live-weight, per week, of the oxen fed from January 2 to February 28, with cooked oilcake-compound (Table III.), with those fed during the same period with cooked linseed-compound (Table IV.), it is seen that the oilcake-compound gives considerably the best result. The oilcake-compound also gives a better result in Experiment 6 (Table VI.), than the linseed-compound in Experiment 5 (Table V.). In fact, oilcake, weight for weight, should be little inferior as a food to the much more costly linseed, whilst the manure from cake will certainly be more valuable than that from an equal amount of linseed.

Comparative Productiveness of the Foods in the Different Experiments.

The comparative productiveness of the foods in the different experiments is more clearly illustrated in Tables VII.—X. inclusive. Table VII. shows the *total* amounts of food, litter, increase, and dung (both fresh and dry), for each experiment; and Table VIII. the amounts calculated *per head per week*. But Table IX., showing the amounts of food (fresh and dry) consumed per 100 lbs. live-weight, per week, and Table X. the amounts required to give 100 lbs. increase in live-weight, afford the best means of comparison.

Taken over the final 8 weeks of fattening, there was more dry substance of food consumed per 100 lbs. live-weight per week, and 1½ time more required to yield a given amount of increase in live-weight, in Experiment 1, with crushed oilcake, than in Experiment 2, with cooked linseed-compound.

In Experiments 3, 4, 5, and 6, the consumption by a given weight of animal, within a given time, was, of oilcake or linseed-compound about one fifth less, of clover-chaff 1½ time or more greater, and of roots a little greater, than in Experiments 1 and 2. The dry substance of the mixed food of the former would therefore contain a less proportion of that from the more nutritive cake or corn, and considerably more from the chaff and roots, but particularly from the chaff. The result was that there was much more *total dry substance of food* consumed to a given weight of animal in Experiments 3, 4, 5, and 6; a part of the extra amount being doubtless due to the larger amount of indigestible woody-fibre in the chaff.

Experiment 3 with cooked oilcake-compound, and 4 with cooked linseed-compound were exactly parallel as to the number of animals and the time of feeding. Taking the average over the whole period of fifty-seven days, the two lots consumed almost identical amounts of the dry substance of food per 100 lbs. live-weight per week; but it required about one-fourth more with the linseed than with the oilcake-compound, to yield 100 lbs. increase in live-weight.

Experiment 5 with 6 oxen, and 6 with 5 oxen, were nearly equal as to the length of time; though the latter was not commenced until a fortnight after the former was concluded. The oxen of Experiment 6, with the oilcake-compound, consumed rather less dry substance of food per 100 lbs. live-weight per week, and yielded much more increase for a given amount consumed.

Reviewing all six experiments the result was, that the cooked linseed-compound gave more increase than the merely crushed oilcake; but in both the cases in which cooked oilcake-compound was used, it gave a better result than the cooked linseed-compound. And, as already observed, the manure from the oilcake-compound would be better than that from the more expensive linseed-compound.

Again, in all five experiments with cooked food, there was more increase in live-weight for a given amount of the mixed dry substance consumed, than in the one with uncooked food; but the gross or live increase from the uncooked food would probably contain a rather larger proportion of dry or solid substance, though certainly not sufficiently so to make up in quality, for the deficient quantity of increase in the single experiment now under consideration. Supposing the result to be, in practice, generally in favour of cooking in anything like the degree shown in these few experiments, the process would doubtless be advantageous at any rate to the *producer*, if conducted sufficiently economically; and where, as at Woburn, the cooking arrangements are adapted for a large quantity of stock, the cost per head need be but very trifling.

Comparison of the Results obtained at Woburn, with those of other Experimenters.

In Table XI., which follows, the average results of all the experiments at Woburn, including 44 oxen, fattening over periods varying from 5 to nearly 9 weeks, are compared with those of the published experiments of Colonel McDouall,[*] and Mr. Templeton,[†] on the same points, so far as we have been able to estimate them without direct analyses of the foods employed :—

TABLE XI.

Experimenters.	Number of Animals.	Average duration of Experiment.	Dry Substance of Food consumed.			Increase per 100 lbs. Live-weight per Week.
			Per Head per Week.	Per 100 lbs. Live-weight per Week.	To produce 1 lb. Increase in Live-weight.	
		days.	lbs.	lbs.	lbs.	lbs.
Duke of Bedford ..	44	53	169¼	11·6	13·1	0·89
Colonel McDouall ..	56	105	132½	12·8	13·8	0 92
Mr. Templeton	12	132	126	11·1	9·3	1·19
Average	(112)	87	146¼	12·1	13·0	0·94

The average result at Woburn was, that 11·6 lbs. of the dry substance of the mixed foods were consumed per 100 lbs. live-weight per week, and 13·1 lbs. were required to produce 1 lb. increase in live-weight. Thus, oxen fed under cover, and with a liberal proportion of cake or corn in their food, consumed per week, dry substance equal to nearly one-eighth of their weight, and yielded increase equal to less than 1 per cent. of their weight. If, however, we reckon the rate of consumption over the whole 3 months of Experiments 1 and 2, to have been the same as during the 2 months when the foods were actually weighed, and take the increase at the rate of the 3 months, the average result at Woburn would then be, that only 11·5 instead of 13·1 lbs. of dry substance of food were required to produce 1 lb. increase in live-weight. Or, if we altogether exclude from the calculation Experiment 1, in which the increase for food consumed was certainly very low, the average amount required would be 11·6 lbs. In either case the increase would then be almost exactly 1 per cent. per week, on the weight of the animals.

In the experiments of Colonel McDouall, some of the oxen were fed in boxes, some in stalls, and some in open sheds. The food generally consisted of cake or corn in somewhere about the same proportion to the weights of the animals as in the Woburn experiments; straw-chaff in considerably less proportion than clover-hay chaff was given at Woburn; and roots in larger proportion. Upon the whole, the dry substance of the mixed food would be of rather higher quality in the Woburn experiments.

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[*] 'Journal of the Royal Agricultural Society of England,' vol. xiii. pp. 113–123.

[†] Ibid., vol. xvi. pp. 163–9.

Consistently with this, Colonel McDouall's oxen required rather more, both in relation to a given weight of animal within a given time, and to produce a given amount of increase; but they yielded slightly more increase in relation to their weight. The comparison would of course be still more in favour of the results at Woburn than the Table shows, if the corrections above supposed be adopted.

In Mr. Templeton's experiments the animals were also fed under cover. The food consisted of hay, straw, and roots, without any cake or corn. Taking the data as they are given, our calculations show that, with this comparatively inferior food-mixture, there was less dry substance required, both in relation to a given weight of animal within a given time, and to produce a given amount of increase, than in either of the other cases of much higher feeding. In fact, we are inclined to think that there must be an error somewhere, in the records of Mr. Templeton's experiments.

Upon the whole, we think the general averages given in the bottom line of the Table, may be taken as very fairly representing what should be the result of fattening oxen, liberally, and under cover. We assume that, in round numbers, they will consume 12 to 13 lbs. dry substance of their mixed food per week, for every 100 lbs. of live-weight; and that, for this 12 to 13 lbs. they will yield 1 lb. of increase in live-weight—that is, increase equal to 1 per cent. per week, or nearly, on their weight.

Comparison between Oxen, Sheep, and Pigs.

In the next Table (XII.) the above general average results obtained with fattening oxen, are compared with those of our numerous experiments with fattening sheep and pigs:—

TABLE XII.

	Number of Experiments.	Number of Animals.	Average duration of Experiment	Dry Substance of Food consumed.			Increase per 100 lbs. Live-weight per Week.
				Per Head per Week	Per 100 lbs. Live-weight per Week	To produce 1 lb increase in Live-weight	
			days	lbs	lbs.	lbs.	lbs.
Oxen	27	112	87	146½	12·1	13·0	0·94
Sheep ..	19	307	143	20½	15·9	9·2	1·72
Pigs	33	104	58	48	27·0	4·8	5·62

Before considering the results recorded in this comprehensive Summary Table, the reader should call to mind the distinctions between the different animals, in point of structure, and the character of their food.

We have shown in the last number of this Journal that, in proportion to the weight of the body, oxen have considerably more of stomach and contents than sheep, and sheep considerably more than pigs. On the other hand, pigs have a considerably larger proportion of intestines and contents than sheep, and sheep more than oxen. But, of stomachs and intestines and their respective contents, taken together, oxen have a larger proportion than sheep, and sheep a larger proportion than pigs.

Again, the dry substance of the mixed food of oxen contains a larger proportion of woody-fibre than that of sheep, and that of sheep considerably more than that of pigs.

The results recorded in the Table are quite in conformity with the facts here stated, regarding the comparative structure of the different animals, and the comparative character of their respective foods.

Thus, oxen, with the most bulky and, weight for weight, least nutritious food, have the largest proportion of stomach, and the least of intestinal surface for the absorption of nutritious matter; they give also the least proportion of increase for a given amount of dry substance of food. Sheep come next in order to oxen in these respects. The dry substance of the food of the pig is, in much the largest proportion digestible, and available for assimilation and respiration; he has much the largest proportion of intestinal surface for the absorption of nutritious matter; and he yields much the most increase for a given amount of dry substance of food. Calculation further shows that, oxen expend in respiration the most, sheep considerably less, and pigs much the least, of the dry substance of food in proportion to a given amount of fattening increase yielded.

The general result, stated in figures, is that, 100 lbs. live-weight of the fattening ox should yield about 1 lb. of increase per week, consuming 12 to 13 lbs. dry substance of food to produce it. 100 lbs. live-weight of fattening sheep should yield about 1¾ lb. of increase per week, consuming 15 to 16 lbs. dry substance of food. Lastly, 100 lbs. live-weight of the fattening pig should yield 5 to 6 lbs. of increase per week, consuming 26 to 28 lbs. dry substance of food to produce it.

To sum up the comparison between fattening oxen, sheep, and pigs, when liberally fed under cover, the facts may be briefly enumerated as follows:—

1. In proportion to a given live-weight within a given time, sheep will consume about 1¼, and pigs about 2¼, times as much dry substance of their food as oxen.

2. Oxen should yield per week about 1, sheep about 1¾, and pigs 5 to 6 per cent. of their weight, of increase.

3. To produce 1 lb. of increase, oxen will require 12 to 13 lbs.,

sheep about 9 lbs., and pigs from 4 to 5 lbs. of the dry substance of their respective foods.

Produce of Manure in the Woburn Experiments.

On the present occasion we shall only call attention to the amounts of *fresh* and *dry* dung obtained for given amounts of food and litter employed; leaving the question of the chemical composition of the manure in relation to that of the food and litter, for separate consideration at a future opportunity.

In Table VII. (p. 207) the total amounts, and in Table VIII. (p. 208) the average amount, per head per week, of food, litter, and dung (both fresh and dry), are given separately for each of the six experiments. In Table XIII. which follows, the amounts per head per week, and per 100 lbs. live-weight per week, and also the amounts of food and litter yielding 1 ton of fresh dung, taking the *average* of the six experiments, are given:—

TABLE XIII.

	Food, Litter, and Dung.				Food and Litter, to produce 1 Ton fresh Dung.	
	Per Head per Week.		Per 100 lbs Live-weight per Week			
	Fresh	Dry	Fresh.	Dry.	Fresh	Dry.
	lbs	lbs	lbs	lbs.	lbs	lbs.
Cake or corn	43¼	37¾	2·92	2 55	168	147
Clover-hay chaff ..	110¾	91½	7·59	6·28	431	356
Swedish turnips	377	40	25 81	2·74	1469	156
Total food ..	531	169¼	36·32	11·57	2068	659
Litter	133	106¾	9·10	7·30	518	416
Total food and litter ..	664	276	45·42	18·87	2586	1075
Dung	575	156	39·33	10·67	(2240)	(608)

Thus, taking the average of six experiments, extending over an average period of nearly eight weeks, and including 44 animals of a mean weight of about 1470 lbs., there were consumed per head per week, about 43¼ lbs. of cake or corn, 110¾ lbs. clover-hay chaff, and 377 lbs. roots; in all 531 lbs. of food. There were used besides, 133 lbs. of litter. The total food and litter was therefore 664 lbs.; and the amount of fresh dung produced was 575 lbs. The dry substance of the dung was 156 lbs., that of the litter being only 106¾ lbs.; there was a gain therefore of about 50 lbs., or nearly one half, upon that of the litter used. The dry substance of the food and litter together was, however, 276 lbs., yielding in dung 156 lbs., or only 56½ per cent. of the total. 43½ per cent. of the dry substance of the food and litter were, therefore, either stored up as increase, expended by the animal in respiration, &c., or lost by the decomposition of the manure.

To produce one ton of fresh box dung, there were consumed 168 lbs. cake or corn, 431 lbs. clover-hay chaff, and 1469 lbs. swedes; in all 2068 lbs. of food, besides 518 lbs. litter, making a total of 2586 lbs. food and litter. This contained 1075 lbs. of dry substance, and the ton of dung 608 lbs.

The litter contributes considerably the largest proportion of the dry or solid substance of the manure heap. In fact, it is the amount of litter, wetted to a certain condition of moisture with the liquid and solid excrements of animals alone if the manure be made under cover, or with these excrements and water if made in open yards, that chiefly regulates the bulk and weight of the heap. Hence, practical men have generally taken the amount of litter at command as the basis of their estimates of the amount of manure produced on a farm. The following Table (XIV.) shows the amounts of dung (fresh and dry) obtained for 100 parts fresh litter used, in each of the six experiments at Woburn.

TABLE XIV.

Experiments	Number of Days	Number of Animals.	Description of Food	100 lbs. fresh Litter produced,	
				Fresh Dung.	Dry Dung.
				lbs	lbs.
1	60	11	Crushed oilcake; clover-hay chaff, and swedes	41[illegible]	117
2	60	12	Cooked linseed-compound; clover-hay chaff, and swedes	398	101
3	57	5	Cooked oilcake-compound; clover-hay chaff, and swedes	*441	118
4	57	5	Cooked linseed-compound; clover-hay chaff, and swedes	*450	120
5	36	6	Cooked linseed-compound; clover-hay chaff, and swedes	528	143
6	35	5	Cooked oilcake-compound; clover-hay chaff, and swedes	*421	129
Average	53	(44)	.. ..	434	118

In the article on manure in Morton's 'Cyclopædia of Agriculture' it is stated that Mr. J. C. Morton found oxen feeding in boxes, to require 20 lbs. of straw per head per day, as litter. Mr. Evershed, in his prize essay on 'The proper office of Straw on a Farm' (R. A. S. Journal, vol. xxi. part 1), states that he finds an ox will make 8 tons of fresh dung in six months, using

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* In Experiments 3, 4, and 6, the weight of "absorbent" used is reckoned as so much litter.

32 cwts. of litter. This is equal to about 19½ lbs. of straw per head per day; and according to this estimate each ton of litter gives 5 tons of fresh dung.

The average result of the 6 experiments at Woburn gives 133 lbs. litter per head per week, or 19 lbs. per day; and the amount of fresh dung corresponding to this was 575 lbs. per week, or 82½ lbs. per day. Or, as the Table shows, 100 lbs. of litter gave on the average 434 lbs. fresh dung; that is, 1 part litter gave 4¼ parts dung.

But it is generally estimated that more than twice as much litter must be employed per head, when animals are fed in open yards. Assuming this to be the case, and supposing, for the sake of illustration, the weight of fresh dung to bear the same proportion to that of the litter in both cases, it is obvious that a given amount of litter used in open yards, will be saturated with only about half as much of the excrements of animals as it would be in boxes, the remainder of the moisture being made up by rain.

At any rate, it is clear, that the amount of the constituents derived from animal excrements that will be carted to the field in each ton of dung, will be extremely variable according to the mode of its manufacture. In fact, a given amount of litter may be made the vehicle of conveying to the field, at an equal cost of cartage, about twice as much of the valuable constituents of animal excrements in the one case as in the other.

From the facts given above it may be concluded, as a general average estimate, that when full-grown oxen are fed in boxes they will require about 20 lbs. of straw per head per day, as litter; and that they will produce fresh dung equal to about 4½ times the weight of the litter used.

XIII.—*Report on the Exhibition of Live Stock at Leeds.* By W. Fisher Hobbs, Senior Steward.

As I consider that the sooner such Reports as these are published, the more valuable they are likely to be, I hasten at once to embody such information as I have been favoured with by some of the gentlemen who acted as Judges at the Leeds Meeting.

My own part in this might be very briefly summed up, when I echo the general opinion that the Royal Agricultural Society of England has "never had so successful a show." Of course there were one or two kinds of stock, such as the Herefords and Devons, which might have been better represented; but any falling off in these classes must not be taken as evincing any decline in the character or popularity of such breeds; the entries were simply small, from the distance the breeders were from their own districts. Excepting the two sorts I have just mentioned, there was scarcely an established breed of cattle, horses, sheep, or pigs, that did not show to increased advantage, either when taken by the test of mere numbers, or by the yet more satisfactory sign of improved appearance and quality.

CATTLE.

Shorthorns.—As might have been expected in the midst of their native pastures, this breed of cattle was one of the great attractions of the show; and I have the authority of the Judges for stating that they consider them to have been a larger and a better lot than any previously brought together.

Class I.—Although the old-bull class was a very large one, it was not more remarkable for the number of animals than for the number of *good* animals.

Classes II. and III.—The younger bulls, although including many excellent specimens, still contained (according to the opinion of the Judges) some animals that did not possess the quality of flesh so requisite for maintaining the character of the highly-bred short-horns.

Class IV.—The cow class included eight or ten extraordinary animals, but it is to be regretted that the fashion of the day for high feeding prevents many of our best breeders from exhibiting some of their most valuable females. Still it was a good sign to see one or two exhibitors setting their faces against this malpractice, and sending their stock in only a fair breeding condition.

Classes V. and VI.—These heifer classes were numerous and deservedly admired; they are a proof of judicious breeding, and the future success of short-horns.

Class VII.—Both the bull and heifer calf classes were numerous and good, and are evidently becoming very popular.

If there was any falling off in the quality of some of the animals in the bull classes, this was not so observable amongst the cows and heifers. All the best tribes were there represented, and the justly celebrated Bates's blood was once more triumphant.

Herefords.—Mr. Duckham, one of the Judges of Herefords, and editor of the 'Hereford Herd-Book,' thus writes to me on the state of a breed of cattle he is doing so much to maintain:—

"In these, as in all classes, when the Society's meeting is held at a great distance from their home, the number of the entries was reduced in proportion to that distance. At our recent show this valuable breed was not as well represented in numerical strength as on many former occasions: we find that this may have partly arisen from the sales of several herds which heretofore formed valuable acquisitions to our shows. Yet it was very gratifying to remark that we had some fresh exhibitors, and that the area from whence they come to our show is gradually enlarging. A few years since we were mainly supplied by the county from whence they take their name. This year the entries were 38, out of which 37 entered the arena of competition; only 17 of these were from Herefordshire, the remaining 20 were respectively from the counties of Glamorgan, Brecon, Montgomery, Salop, Gloucester, and Surrey.

"In Class I., Mr. Rea's 'Sir Richard' was a massive, compact, heavy-fleshed animal, displaying a beautiful placid countenance, denoting that docility for which this breed is highly distinguished; his general character led us to imagine that he was descended from no mean race, and upon reference to 'The Herd Book,' we find he claims the distinguished bull 'Sir Benjamin' as his sire, and the still more celebrated 'Sir David' as his grandsire: he is also closely allied to 'Royal,' and other prize-winning animals at this Society's shows. 'Sylvius,' winner of the second prize, claims the same sire as 'Sir Richard;' but 'Honour,' winner of the third prize, presented an appearance which bespoke a different parentage, and we find he is descended from quite a distinct strain of blood, as is denoted by his long, level, fleshy back, bearing a broad white stripe along the whole length, namely, from that once-fashionable blood known as the 'Tomkins' breed. He was the only animal exhibited which did not in all its marks of colour perfectly correspond with the characteristic description of the Hereford given in a recent number of this Journal.*

"In Class II. Mr. Hill's 'Milton,' winner of the first prize, displayed great constitution, plenty of good flesh, which was evenly laid on, and in his general character great perfection of breeding. He was rather dark in colour, and here we think it worthy of notice that nearly all the first-prize animals and many of the second were of the same dark colour; and upon again referring to 'The Herd Book' we discover a remarkable fact, that they are all closely allied to the well-known strain of blood called the 'Knight Greys,' a breed kept together by the late T. A. Knight, Esq., Downton Castle, and originally descended from the 'Tully Greys,' which were nearly all of a light grey colour, sometimes perfectly white. That the produce from such light-coloured animals when crossed with what is now acknowledged to be the aboriginal breed should be so much darker in colour, is certainly very peculiar; yet so it is, for not only is the same line of blood traceable in 'Halston' as in 'Milton,' but also in 'Pitchford,' 'Lincoln,' 'Laura,' 'Countess,' 'Ruby,' 'Rose,' 'Beauty,' 'Plum,' 'Theora,' 'Adela,' and 'Duchess;' out of these only 'Pitchford' and 'Adela' were of the light red colour. We must here remark that, with regard to Class VI., consisting of yearling heifers, in the description of 'Beauty' contained in the Leeds Catalogue, the numbers entered in parenthesis do not refer to the 'Herd Book,' and it is hard to see what other significance could be fairly assigned to them. If these figures refer to any private number, they ought hardly to have been inserted in the Society's Catalogue in a manner identical with that adopted for reference to the 'Herd Book,' such insertion being calculated to mislead the public."

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* See Mr. Robert Smith's Live Stock Report of Warwick Meeting.

Devons.—Mr. Robert Smith, one of the Judges of the Devons, has supplied me with the report of them, as well as of the Sussex and other established breeds, and the dairy cows:—

"These classes, although by no means well filled, brought together 40 specimens of the élite of our English cattle, which, considering that the meeting was held upwards of 300 miles from their homes, may be spoken of as a good sample of 'the long red line.' Still we missed with regret the beautiful forms which some of the breeders exhibited at their stands in former years. Perhaps they are waiting in ambush, and will come with a rush in '62. This muster-roll of 40 entries consisted of 9 aged bulls, above 2 years old; 6 under 2 years; 5 bull calves; 4 dairy cows; 3 in-calf heifers; 10 yearling heifers; and 3 heifer calves.

"The aged bulls were varied in their character, both as regards size and quality. The nearest approach to the 'cylindrical form' was found in Mr. Bodley's 3 year and 1 month-old bull 'Perfection,' who had also 8 months in his favour, as against his two nearest opponents, viz., Mr. Turner's 'Prince Frederic' (second), and the Prince Consort's 'Colonel' (third), who were each 3 years and 9 months. The contest between the latter was close and intricate, but at length the more extended frame of 'Prince Frederic' overruled the stylish 'Colonel.' Beyond these no special mention was made of the remaining competitors.

"In Class II. Mr. Farthing's 1 year and 7½ months-old bull, 'Viscount,' walked over for the first prize in his class, against five other competitors. He is said to be the best yearling that has been shown for years. He was much noticed by the Hereford and Shorthorn men. Mr. Merson's second prize-bull had more of the North Devon element about him; small in size but right in form and quality. Mr. Turner's yearling, only *just* come within the cords, saved his distance, and was placed third. The public had an eye to a 'commended' specimen lower down, No. 251, in whose case want of condition and generalship told against the due appreciation of his high breeding.

"In Class III. the bull calves again gave Mr. Farthing a first place with a fleshy young animal, 6 months-old; for the second, a severe contest ensued, the decision was deferred, and a second 'walk out' resorted to, when the Prince Consort's 7½ months-old calf received second honours, and Mr. Hole's 8½ months calf was highly commended. Mr. Hole had also a second calf of great merit, but not quite up in condition; we judge he will be seen another day, perhaps in '62.

"Class IV.—Although 4 cows were entered only 2 came to the post. A most delicate decision ensued—the race being between two rival breeds—the pure North Devon of the Turner herd, and a robust, highly-fattened specimen from the Prince Consort's herd. However, substance in this case could not be parted with for certain symmetrical proportions along the top line, when coupled with faulty proportions of the under line; and thus the Windsor 'Ilex' beat the Barton 'Piccolomini.'

"Class V., the In-calf Heifer Class, contained three really good animals, but rather varied in their character; so much so, that it became a question as to how they should follow suit: whether symmetry or substance should prevail. Up to this point it was evident that the judges had been in search of size, and they had so far succeeded in their mission. Now came the tug of war; again and again were they paraded, touched, eyed, and examined, when a reflection upon the standard of animal hitherto selected, placed the winning card upon Mr. Pope's light-coloured heifer, with immense substance and good form, to the exclusion of his more symmetrical heifer of lower standing, which had, under present circumstances, again to succumb to Mr. James Hole's heifer, which proved a wedge between the pets of 'Toller.'

"Class VI.—In the Yearling-Heifer Class we had again a similar case, but with a much greater disparity in the animals. Here again the Judges were called upon to decide between a 1 year 6¾ months-old heifer, of immense substance, early maturity, and fair quality, and others of more symmetrical proportions, but of less size and growth, and from 3½ to 4½ months' advantage in age. The 10 animals were marshalled in line and quickly drafted to 5, then the race began; there were 4 left to represent the North Devon character, and 1 from Somerset; the question at issue being whether the latter be placed first owing to her early maturity, &c., or be out of it altogether. Again and again were they classified side by side, reversed, reviewed, and handled, and at length returned to their stands to 'wait a little longer.'

"The Sussex and other Breeds Classes finished, the review was resumed, the die was cast, size again prevailed, and the first card up was placed upon Mr. Farthing's heifer, the second and third upon Mr. Merson's, and the remaining two, viz., Mr. James Hole's and Mr. G. Turner's, were highly commended.

"Mr. James Davey's 6½ months-old prize heifer calf was a perfect *gem.* Its touch, coat, offal, and beautiful contour, surpassed anything we remember to have seen in former years. Mr. Turner's second calf was a useful specimen, as was also the commended one, exhibited by Mr. Hole, of Hannaford.

"*Sussex Cattle.*—These classes brought out but two entries, an in-calf heifer and a yearling bull, and they each received a prize, although the latter scarcely deserved to be noticed.

"*Other Breeds.*—It would seem by the scanty competition for these prizes, that the door opened as a convenience to them had been but little appreciated; a pair of Suffolk heifers, a few Bretons, and an Aberdeenshire bull formed the competition for the premiums.

"The Aberdeen bull was a splendid type of his breed, and would have been hard to shake off, even by a numerous entry. The Suffolks were said to be good of their order, as were also the black and white Bretons of Mr. Baker. Indeed the bull was very beautiful; his head and eye were a complete study.

"The real dairy cow for once was at her post, and truly represented by a finely grown animal of immense proportions, yet with an even outline, a 3-gallon-a-meal bag, and a somewhat bony frame.

"Two high-bred cows, full of *beef* and no milk, were entered for 'dairy purposes,' but the Judges of course treated this as *a ruse*, and passed on to the *milking* specimens."

HORSES.

There were few greater treats at Leeds than the exhibition of horses; while the plan, first adopted here, of showing the different classes day after day in the ring in which they had been judged was so much enjoyed by the spectators, that I very strongly recommend its continuance, so that the public may again be enabled to see the horses exhibited to the best advantage—that is, when in action. The following extracts from the report of Mr. Spooner, the Veterinary inspector, are highly satisfactory, demonstrating that the Horse Show of the Royal Agricultural Society of England is not only improving in its general character, but that in the great essential of "soundness" our horses are becoming more and more valuable. How far this may be attributable to the regulations recently enforced may be with some a matter for consideration: for my own part I fully believe that a certain and necessary stringency in this way must eventually result in national good, however much some breeders may object to having their horses subjected to so trying an ordeal. The mere fact of giving premiums to animals with hereditary diseases would defeat the very object of the Society, whilst the decision of first-class practical judges will always be strengthened by the co-operation of an able veterinarian. Mr. Spooner writes thus:—

"I have the honour to lay before you the following brief report of the duties performed by me as Veterinary Inspector of the horses entered for the various prizes given by the Society.

"Every horse admitted into the Show-Yard was duly subjected to a careful examination both as to its general soundness, and especially with reference to its freedom from disease of an hereditary nature; and the result of these examinations was made known to the Judges prior to their awards being determined upon.

"I am gratified to be enabled to state that, although the number of horses exhibited was far greater than on any former occasion, my note-book furnishes fewer cases of unsoundness of a nature calculated to interfere with the usefulness of the animals for breeding purposes. I particularly noted the comparative absence of constitutional ophthalmia and respiratory diseases; also of those morbid ossific deposits termed 'spavins,' 'splints,' 'ringbones,' 'sidebones.'

"This marked improvement is doubtless due to the importance attached to these diseases in the previous awards of the Society, and to the very excellent regulation of the Council, which requires that every horse, prior to its admission to the Show, shall have been examined, and a certificate given as to its soundness by a member of the Royal College of Veterinary Surgeons.

"I may, however, add that I met with several very marked and objectionable diseases, which, although only to be viewed as exceptional cases, serve to convince me that the veterinary surgeons who examined the horses affected with those diseases either failed to perform their duty with ability and truthfulness, or that the certificates given by them have not been duly read and weighed.

"In the class of Thoroughbreds and Cart-Horses there were some very bad cases of 'roaring' and 'whistling,' and of chronic diseases of the feet.

"Of this latter class of disease, I feel it to be my duty to particularise one instance, viz.: '480, Class I.—Stallions for Agricultural Purposes.' This horse had generally defective fore feet, with very large fissures or sandcracks in the hoofs, which had been stopped up with gutta percha and pitch to such an extent that I succeeded in picking out large portions of this composition, and thereby exposing the defect."

My brother-steward, Mr. Pain, who so zealously superintended that department, reports to me as follows on an improving section of our show:—

" *Thorough-bred Horses.*—The prize of 100*l.* brought together an entry of 18, and was awarded to 'Nutbourne,' a horse that sustained the character for improving and perpetuating the breed of the sound and stout thorough-bred horse for general stud purposes. The owners of the very high class of race-horses are not likely to send them, and run the risk of travelling and exposure, for the sake of the 100*l.* without better accommodation be given. I would strongly recommend that the prize should be continued.

"*Cleveland Horses.*—This class was but badly represented, and from what was seen at Leeds, where the Clevelands were expected to be in great force, it appears that this breed of horses has receded and degenerated, if not quite disappeared.

" *Hunting Stallions.*—12 horses were exhibited in this class, the first prize going to 'Canute,' an animal of high quality. The second-prize horse was not thorough-bred, and the question arises in my mind whether the Society should not insist that all horses competing in this class should be thorough-bred? There were some very excellent horses exhibited in this class, and on no occasion have there been fewer horses with any unsoundness. This very important class commands great attention, and most deservedly so. A prize of greater value should be given to it.

" In the class of hunting brood-mares, scarcely a good animal was present.

" *Blood Hunters.*—For the prize given by the Local Committee, a large and splendid collection of horses was brought together. No class in the yard was more highly appreciated or commanded so much attention. The facility afforded to the public of seeing them in action greatly contributed to the success of the show. It is to be hoped that the hunter will receive more attention from the Society, and that a prize will be given for these horses at the annual show by the Council, and not by the Local Committee. Better accommodation should be afforded these horses, many of them being of great value: and unless something is done to meet the complaints of exhibitors in this class, owners of horses will not continue to exhibit them.

" Coaching stallions and mares require no notice, except to say that they were of a very different class to what might have been expected in a district which has always been considered to produce this class of animal to perfection.

"*Roadster Stallions.*—A very fine class of animals. The prize horse, a red roan, was a very excellent animal, with free action and great activity, showing very strongly the breed of the old Norfolk trotter. He only required a little more appearance of breed about the head to make him a perfect stallion, for getting that most desirable animal, the 'cob.'

"The roadster mares or geldings were not a very high quality, and there is no doubt that if this prize should be continued by the Society, great improvements will take place in a very useful animal.

"The pony class was a very pretty one, but it is much to be regretted that these animals, if worthy of notice by the Society, were not thought worthy of having a prize set apart for a good sire.

"*Lord Londesborough's Class.*—This class, which specially attracted and interested the public, contained many splendid animals of high quality and great value, and was deservedly 'highly commended' by the judges.

"*Agricultural Stallions.*—There were 27 horses of very good quality in this class, in which a great improvement upon the Warwick and Canterbury Shows was manifested; but that for two-year-old stallions was not so good. The Mares and Foals class had some very good animals, but not of a very high standard.

"*Two-year-old Fillies, Agricultural.*—Some very nice animals were exhibited here; two very excellent fillies belonging to the Prince Consort were greatly and justly admired.

"*Dray-Horses.*—In Class I., some very fine horses were entered which showed to great advantage in the ring.

"In Class II. the judges awarded no prize, and in the rest of the classes the entries were few, and of no great merit.

"In conclusion I would observe that if the prizes for hunting and thorough-bred horses are adopted by the Council, better arrangements will be required both for the comfort and security of these valuable animals; by taking such measures the Society will receive better support, and the public derive the great gratification of witnessing a splendid exhibition of much national importance. The formation of a ring for exhibiting the horses was considered a great boon by the public."

SHEEP.

Leicesters.—The Judges did not consider these classes quite so good as usual, notwithstanding that Mr. Sanday continued to send a number of his best sheep, which, as heretofore, were generally victorious, although certainly beaten in one instance by Colonel Inge, who for several years has bred regularly from the Holme Pierrepoint flock.

Southdowns.—There was a decided falling off in the number of pens exhibited. The Judges inform me that they did not consider the classes quite up to the average of what they have been, and there is no question but that the absence of the famous Babraham rams was materially felt. The old sheep were considered to be better than the shearlings. Although Mr. Jonas Webb did not exhibit, his strain of blood was represented by Mr. Rigden, who, it will be seen, at once succeeded to the post of honour. The Goodwood flock was also represented by a beautiful pen of shearling ewes, and Lord Walsingham, as usual, gained prizes and commendations.

Shropshires.—There was a splendid exhibition of this valuable breed of sheep, and the Society have done quite right in granting separate classes for them. Mr. Randall, one of the Judges, gives the following excellent Report:—

"Perhaps no description of sheep excited more interest in the show-yard than these. It is only within the last eight or ten years that they have come prominently into notice; and it was not until the Canterbury Show last year that their claims to be considered a distinct breed were recognised by the Royal Agricultural Society. Yet here we find them in greater numbers than any other breed of sheep shown; and the Shropshire flockmasters certainly deserve credit for the way in which they have responded to the encouragement which has thus been given to them. It is impossible not to be struck with the appearance of these sheep, as a most useful, rent-paying kind of animal; and if they have not yet attained that uniformity of character which we are accustomed to see in some other breeds, it must be admitted that they possess all the elements which are required to constitute a near approach to perfection; and all that the Shropshire breeders have to do is to concentrate these qualities by careful and judicious selection. In the class for yearling rams upwards of fifty were shown, most of them heavy-fleshed animals of considerable merit; a few indicating the effect of crossing with the Southdown more or less remotely, and possessing less size and robustness of character, though with more compactness of form, and finer but lighter wool. It would, we think, be well for the breeders of these sheep to bear in mind that the qualities which have brought them into notice are—their aptitude to produce great weight and quality both of mutton and wool, combined with early maturity, while they will bear to be stocked more thickly than other breeds of equal weight; that these are the qualities which render them valuable upon the fertile soils of the Midland counties; and that as they can never supplant the Southdowns in the districts to which they are so peculiarly adapted, they had better maintain the distinctive character they have hitherto possessed, even although by crossing with the Southdown they might occasionally produce an animal more fitted for the show-yard. The one, however, which obtains the first prize in this class—Mr. Horton, No. 691—is not of this character; he is quite one of the old school,—a heavy, hardy, yet fat-backed animal, only wanting his shoulders better covered to be all that could be wished. No. 681, Mr. Crane's, is full of quality; a little closer in his coat than we like to see, but a very good one. If he had been a little better behind the shoulders, and stronger upon his legs, it would have been an open question whether he might not have changed places with No. 691. Another of Messrs. Crane's, No. 683, was deservedly commended. No. 713, which obtained the third prize, and No. 714, highly commended, both belonging to Mrs. Baker, are very neat, useful animals, of good size.

"In Class II., for aged rams, the size to which the Shropshires attain was strongly exemplified; and if there was not among them any one possessing the extraordinary merit of Mr. Byrd's sheep, which last year obtained the first prize in this class, there were many admirable specimens of the breed—and foremost among them his half-brother, No. 742, belonging to Mr. Holland. This sheep attracted considerable notice at Canterbury, and now obtained the first prize most deservedly. He possesses immense size, with beautiful form and character. The second prize was awarded to Mr. Horton's, No. 728, a real old-fashioned Shropshire; lighter in the colour of his face and legs than is now sought for; but this defect, if it be one, is more than counterbalanced by the substantial and at the same time level character of the animal throughout. No. 738, Mr. Horley's, another capital sheep, obtained the third prize; and 755, Mr. Foster's, which was highly commended, has an immense depth of frame with excellent quality. Altogether this was a very good class.

"But the most striking class of the three was that for yearling ewes; and a glance at the lot from the end of their pens was sufficient to show that the Shropshires deserve the notice they have obtained. The pen to which the first prize was awarded—No. 757, Mr. Foster's—were admirable; too closely bordering upon the Southdown in their character, but so uniform, so good in form and quality, that they fairly merited the distinction they obtained. But had Messrs. Crane's lot, No. 747, been all like three of their number, they must have been first instead of second. These three were extraordinary ewes, certainly better than any others that were shown. Nos. 748 and 749, also belonging to Messrs. Crane, were commended, and most deservedly. If these gentlemen had sent two pens instead of three, it is probable they might have even improved their position. The third-prize pen—No. 752, Mr. Evans's—were a very uniformly good lot of ewes; and the class altogether did great credit to their owners."

Long-Wools.—This class now commonly signifies "Cotswolds" and "Lincolns." Of the former there was a splendid show, but the Lincolns were not even represented.

Short-Wools.—This class was well supported by "Oxfordshire Downs" and "West Country Downs." I give Mr. Rawlence's Report, as one of the Judges, and I consider his suggestion is worthy of the consideration of the Council:—

"There was a large entry of shearling rams, but the greater portion of them were Oxfordshire Downs, which the Judges now, as in former years, excluded from competition, considering that they do not come within the category of short-woolled sheep. At the same time, the Judges are of opinion that the Oxfordshire Downs should *not* be excluded from competition at these annual Shows, as they believe them to be animals possessing great merit and worthy of having a class to themselves.

"Those exhibited of this breed were a good lot, and some *very* superior sheep, and we much regretted that they did not come under the denomination of short-woolled sheep.

"The West Country Downs were not so numerous as in former years, and, in my opinion, not so good as those exhibited at Salisbury and Chester. The old rams were short in number, but in this class the West Country Downs were much better represented.

"The sheep which took the *third* Prize (belonging to Mr. W. B. Canning, *not* Mr. Humphrey, as stated in the papers) was a wonderful animal, barring his neck.

"The Shearling Ewes were a very good class, and the Judges much regretted that in one of the best lots there were only four sheep, one having died at Birmingham *en route* to Leeds.

"I regret that this account of the classes which came under my adjudication is brief and hurried; had I known earlier that I was expected to draw up a report, I could have entered more fully into their respective merits."

The other kinds exhibited for Local Prizes were for the most part regarded rather as curiosities than breeds, which it would be profitable to experiment upon beyond those districts where they have become naturalized.

PIGS.

On these classes Mr. Turner gives the following Report:—

"Class I. contained some most extraordinary animals for size, but many of them looked much better when lying quietly in the pen than when put upon their legs into their natural position, when their defects were visible.

"In Class II. there was a strong competition. No. 934, the first prize, was a good specimen of his kind, although not so fat as the second prize, which was of good quality. The class generally was well represented.

"Class III. was not so good of their kind as the last, nor were they so numerous as Class II.

"In Class IV. the younger pigs stood first, showing that the breeders of this description are improving. One of this class was unable to stand, and was disqualified on that account; as no judge can decide upon the merits of a pig that cannot stand.

"Class V. was a good one. Many of them, like that of the boars of the same breed, were of extraordinary size, with quality: the second prize, a Berkshire sow, was a capital specimen of her kind.

"Class VI.—This was a most extraordinary class—one of the best I ever saw; so that the Judges had great difficulty in deciding. No. 974, a sow with five pigs, was one of the best in the yard; although not so fat as some, in symmetry she was a perfect model of a sow.

"Class VII.—Not so numerous as the former one, but containing a few good specimens.

"Class VIII.—This was a better class. No. 1013, a very good sow; No. 1006, although an old one, had worn well, and kept her shape well.

"Class IX.—Very short of numbers, and not so well represented as the parent-classes of the same stock.

"Class X. was a capital one. No. 1020 and No. 1021, belonging to Lord Wenlock, were first-rate, particularly No. 1020.

"Class XI.—Only one lot shown.

"Class XII.—Again only one lot of sufficient merit.

"With the exception of Class X. I do not consider the young pigs exhibited denote improvement."

In concluding this Report—necessarily drawn up hastily, but not, I trust, the less acceptable on that account—I have, in the first place, to thank those Judges who have so readily answered to my response, as well as all those who so ably and so independently obliged the Society with their services. In my own particular department—the Cattle—I can say honestly that I believe no set of gentlemen ever acted more ably in discriminating between the mere catching points, and those more innate essentials of good breeding which should tend to reproduce a perfect animal.

In the Shorthorn Classes, which came more immediately under my own observation during the adjudication upon them, I had pleasure in noticing that the form and character of the animal, combined with constitution and quality, were preferred by the Judges to mere grossness of flesh or the artificial temptations of high feeding.

It still remains for me to describe the Nursery Department—a secret corner, wherein the "nurses" dwell—and officials can testify to the growing taste of the rising generation of cattle for "new milk, fresh from the cow." Both early and late were to be seen sixteen "suckers" of all ages, from the calf to the 1 year and 5 months-old heifer, led, not to the slaughter, but to their attendant nurses, who have comfortable apartments, board and lodgings, provided for them free of charge!

The question may be asked, What means all this new milk system? What is a calf? How long should he suck? How many *buckets* of milk, or how many new nurses, should he have? or, in other words, Is there no limit as to the age of a calf and the supply of milk to be provided? At any rate, the 1 year and 5-months heifer is not a calf, unless her going down upon her knees for her "meal of milk" makes her one.

There were formerly some three or four cows sent to the outer yard, of which no notice was taken, as they were chiefly intended to supply extra milk to calves exhibited with their dams; but since the "Calf Classes" have been added this new feature has become enlarged and changed its character, and it will still further increase unless some restriction be enforced. As now allowed, it not only creates a gathering of cows of every denomination and colour (many of them having very questionable dark noses)—Scotch, Irish, Welsh, Channel Islands, and Provincials, without either pedigree or breed—but it also fosters and sanctions the costly system of forcing, which is frequently found to be injurious both to the constitution of the animal and to the propagation of the species.

The Thoroughbred Horse Classes, hitherto more or less a failure at our Shows, were undoubtedly one of the great successes and attractions of the Meeting. There was a true proof of this in the way in which well-bred good-looking horses were bought up during the week; and I certainly think that the precedent of offering liberal prizes for the best-bred horses has been attended with such success at Leeds as to warrant the Council in continuing these prizes, if not in extending them. For all the great properties of endurance, courage, action, and speed, there is no animal so safe to be relied upon as the thorough-bred horse; and I do hope to see from this time his position properly recognized at the Meetings of the Royal Agricultural Society of England.

Amongst other points in the arrangement of our last Meeting was the new feature of admitting members during the week into the Show-Yard free of charge, upon presentation of their tickets, —a plan that has undoubtedly the advantage of more than mere economy to recommend it. A member of the Society thus obtains a certain recognised standing at the Shows, of which I trust we shall see him hereafter more and more inclined to avail himself. With such advantages, and under the presidency of His Royal Highness the Prince Consort, the Royal Agricultural Society of England should surely, during the ensuing year, "increase and multiply" far beyond all it hitherto has done.

XIV.—*Report on the Cheese, Butter, Wool, and Flax, exhibited at Leeds.* By HENRY LUDOLF, Steward.

I regret to have to report that this department of the Show was defective in the number of the exhibitors and the quantity of specimens produced, although their quality was such as might satisfy the severest critic. It is to be hoped that in future agriculturists will show greater alacrity in exhibiting these articles of their produce. In one instance only was the cheese exhibited by the maker, the remainder being sent by dealers.

The butter was of superior quality and colour, particularly that of Mrs. Mary Abbey, of Nimble, near Knaresborough, to which the prize was awarded; that of Mr. James Dumbrell, jun., of Ditchling, Hurstpierpoint, Sussex, would have deserved a second prize, if one had been provided.

The Report on Wool has been delivered in by the Judges.

The green-flax deserved the highest praise; though I have followed the trade for nearly thirty years, I never saw finer line so early in the season. The stem was long, and as well developed for the fibre as the boll was for the seed. The Scotch sample, exhibited by Lord Kinnaird, was only half the length of the others; though healthy and well grown it was very backward. The reason for this is, no doubt, that all the other line was sown early in April, and the Scotch early in May: early sowing is always much to be recommended where the soil and climate permit.

The specimens of prepared flax were highly to the credit of the exhibitors; that of Messrs. Marshall, of Patrington, was pre-eminent in the handling and getting up in soundness of fibre and cleanliness, but the Judges long hesitated in making their award, because that sent by Robert Chase, Esq., of Eye, Sussex, was much finer and softer in quality: their ultimate decision in favour of the former was corroborated when the samples were brought into the market, when Messrs. Marshall's flax fetched 85*l.*, Mr. Chase's 80*l.* per ton.

The hand-scutched flax was also very good; it was however considered that warm-water retting should not be allowed to compete with cold-water retting, as the former system brings out the quality and colour much better than the latter. The flax of James Beashell, Esq., of Rawcliffe, retted in cold water, was of fine and excellent quality, and the fibre was sound and good.

Leeds, July 30*th.*

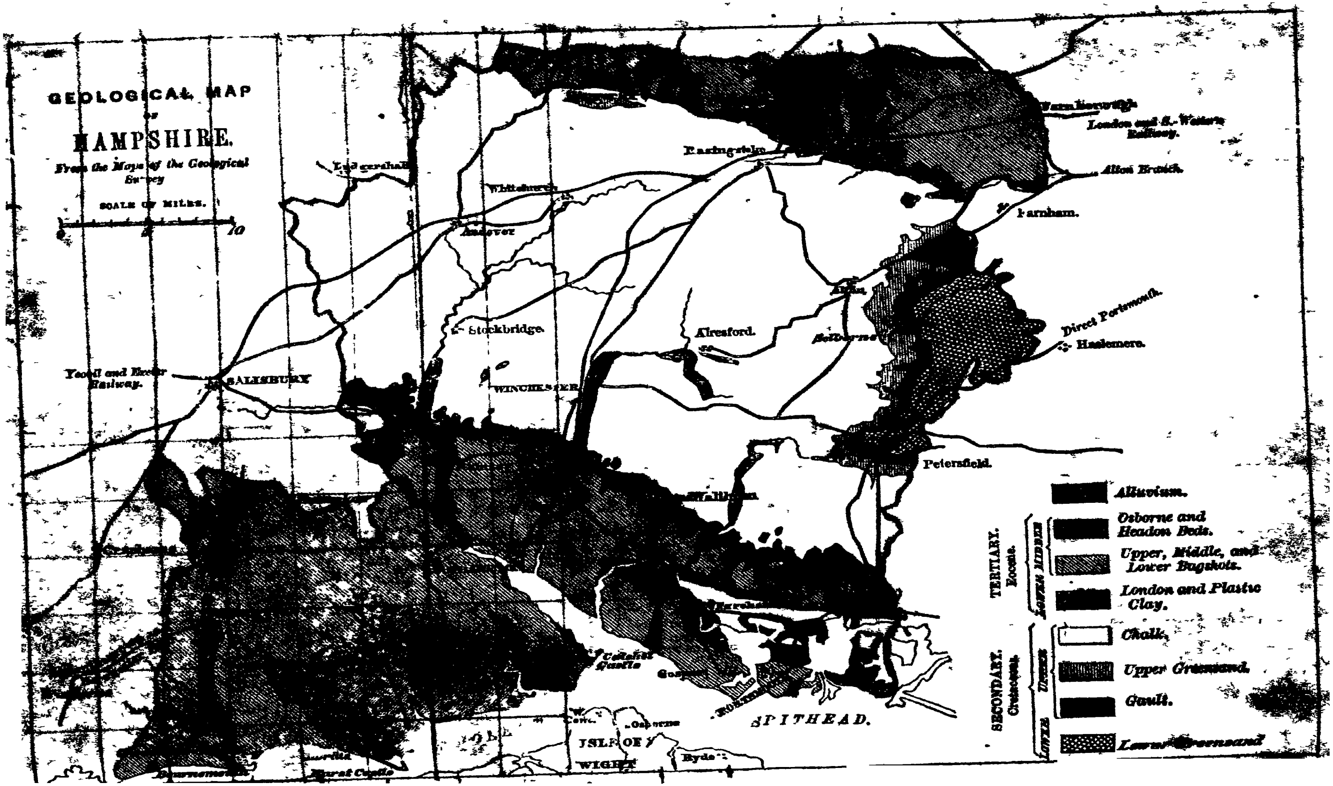
Remarks of Wool Judges.

The Judges regret to find that there are some lots entered as Short Wool which do not strictly come under that denomination, but would have been in their proper place in Sections 5 and 6; but as there are no entries made in those sections which constitute Class III. (probably in consequence of their apparently standing under the head of Long Wool in the Local Prize List), the Judges recommend that the Local Committee be requested to award the prizes that are offered in Sections 5 and 6; and that in future there be three distinct divisions:—

Class I.—Long Wool.
Class II.—Shropshire, Oxford, and Half-Breed Wools.
Class III.—Short Wool.

Thomas Clayton.
James Thompson.

Leeds, 15*th July,* 1861.



GEOLOGICAL MAP
of
HAMPSHIRE.
From the Maps of the Geological Survey

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XV.—*The Farming of Hampshire.* By JOHN WILKINSON, M.A., Rector of Broughton Gifford, Wilts.

THIS Report has been drawn up under instructions to "include the Isle of Wight in the Report on the Agriculture of Hampshire." But since the mainland and the island, however connected by political boundaries, are geographically distinct, to consider them separately will be more suitable to a treatise which respects natural, rather than artificial, divisions.

THE MAINLAND.

WITH the exception of an outlying block of land to the south-west (which is estimated at 325 square miles), the mainland of the county of Hampshire approaches in form to a parallelogram, the sides of which face the four cardinal points. Its extreme length along a line due north and south, and terminating at Southsea Castle, is 40 miles. Diagonally, from north-west to south-east, or from Combe to South Hayling, the distance is 46 miles; and from north-east to south-west, or from Yately to Bournemouth, 65 miles. The area is 970,470 acres, or 230 acres more than 1516 square miles. The population in 1851 was 355,046.* The density of the population was 2·7 acres to each person, which is 0·8 acre more to each person than the average of England.

According to the census of 1851,† the classification of the agricultural portion of the population ("persons of 20 years old and upwards, possessing, or working the land, and engaged in growing grain, fruits, grasses, animals, and other products"), was as follows:—Farmers, 3,109; landed proprietors, 385; agricultural labourers, 24,707; farm bailiffs, 344; indoor farm-servants, 1,066; woodmen, 644; gardeners, 2,185; nurserymen, 61; gamekeepers, 311. The ratio of the agricultural population, thus described, is 17·4 per cent. of the total adult population. The agricultural ratio in England and Wales is 16·1 per cent.; so that Hants is 1·3 per cent. in excess.

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* These figures do not correspond with those usually given in abstracts of the census, and in other manuals. The machinery of the Registrar-General was that of the Poor-law. His registration districts were coterminous with Poor-law unions; but these, when on the borders of counties, contain parishes belonging to different counties; so that registration counties and counties proper are not identical. My figures are for the county of Hants proper, in its two divisions of mainland and island, and have been supplied to me by the Secretary of the Poor-law Board. The following unions, though not in Hants, contain Hampshire parishes: Farnborough, Farnham, Bradfield, Hungerford, and Newbury. The following unions, situated in Hants, contain parishes belonging to other counties: Andover, Basingstoke, Fordingbridge, New Forest, Romsey, and Stockbridge.

† These statistics have been given me by the Registrar-General, and refer to the *whole* county of Southampton, mainland and island. I regret that materials are not accessible for the exact separation of the two. But, considering that the acreage of the island is in relation to the mainland 10·3 per cent., and the population 14·2 per cent., and taking 12·25 as the average, it may be said, that such a proportion of the figures in this paragraph relates to the island.

The classification of farms according to their size was this:—farms of less than 50 acres, 920; of 50 and under 100 acres, 472; of 100 and under 300 acres, 983; of 300 and under 600 acres, 489; of 600 and under 1,000 acres, 134; of 1,000 and under 1,500 acres, 37; of 1,500 and under 2,000 acres, 2; in all 3,048 farms. So that there were 61 more farmers than farms.

The numerical relation of the labourers to their employers was this:—one farmer, cultivating 2,700 acres, employed 90 labourers; 10 farmers, (each) 60 and upwards; 9 farmers, (each) 60—50; 68 farmers, (each) 50—30; 669 farmers, (each) 25—10. Supposing 70 labourers were employed by each of the 10 farmers, 65 by each of the 9, 40 by each of the 68, 17½ by each of the 669, then these 757 farmers employed 15,802 labourers. The remaining 2,351 farmers employed the remaining 8,815 labourers, or 3·7 each.

The total amount expended for the relief of the poor* for the year ending Lady-day, 1860, was 151,673*l.* 9*s.*, which was thus distributed:—in-maintenance, 28,170*l.* 11*s.*; out-relief, 79,642*l.* 1*s.*; maintenance of lunatics, 10,149*l.* 13*s.*; workhouse loan repaid, 2,772*l.* 8*s.*; salaries and rations of officers, 20,461*l.*; other expenses connected with relief, 10,477*l.* 16*s.* The total was 566*l.* 6*s.* (or ·04 per cent.) less than that of the preceding year, which itself had exhibited a decrease of 6·6 per cent. when compared with the year ending Lady-day, 1858. The decrease for England and Wales generally for the year ending Lady-day, 1860, was 1·9 per cent.; for 1859, 5·4 per cent. A long and severe frost between the 17th of December, 1859, and the 19th of January, 1860, together with the increased price of wheat, told against the *general* decrease in 1860, and an unusual pressure experienced in the Lymington and New Forest Unions caused the expenditure in *Hants* to exceed the average of England and Wales by 1·86.

I give, in the appendix, some meteorological tables, with which I have been favoured by Sir John Pennefather, from Aldershot, and by Mr. Spooner, from Eling, near Southampton. I fear they do not prove much more than the exceptional character of the weather during the two last years. And yet 1860, so disastrous to many farmers, is not so remarkable for the total excess of moisture during the year, as for the unusual quantity of rain which fell during the critical agricultural months of May, June, July, August, and September. The unseasonableness of the rain in summer, not its annual amount, did the mischief. The crops could not be cleaned, and generally failed of coming to maturity.

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* These figures refer to the union county of Hants on the mainland only.

More general results might be deduced, for the climate of a particular locality, from a valuable record which Dr. Burney has given me, and which also is printed in the appendix, of the fall of rain at Gosport for 41 years. Its situation by the seaside, and the vicinity of Portsdown Hill, probably make Gosport more damp than places a few miles inland. At least, the annual average of the fall of rain there for eleven years, 1848-58 inclusive, is 29·41, whereas the average at Eling, for the same period, is 26·28.

I. "PRINCIPAL GEOLOGICAL AND PHYSICAL FEATURES."

1. *Geological Features.*

I would emphasise the word "*features.*" The geology of any district should be studied and described for agricultural purposes, not so much with reference to the order in a series, the internal structure, and the fossiliferous remains of certain formations, as with reference to their external appearance, and the manner in which they enter into the visible composition of the earth; how they form the foundation and the surface of hills and valleys, elevated platforms and plains. The farmer's geological description must be two-fold; the first giving the distribution and composition of "rocks;" the second showing the distribution and composition of that soil and subsoil which is the material with which he has to deal, and which may, or may not be, of the same character as the "rocks" proper. The connection between the two parts of this double description is intimate. The first is given under this section; the second will come more appropriately under that assigned to the nature of the soils.

There are few counties, if any, of equal extent, in which the geology is so simple as in Hampshire. It is a peculiarity which will hardly be matched elsewhere in England, that all the formations are recent, belonging to the post-tertiary, the tertiary, and the cretaceous systems. There is nothing more ancient. The range is confined, but within it there is no break in the order of succession. We have here examples of every known species of rock, from the Wealden clay upwards.* Hence the peculiar interest of the geology of this county.

The lower and middle Eocene extends over the whole of the county lying north and east of the North Downs. A straight line (allowing for a slight indentation at Highclere) drawn from

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* The Thanet sands are hardly an exception. A band of sand, only a foot or two thick, with oyster-shells in it, occurs in the county, separating the London and plastic clay from the chalk. In the Tertiary district east of London this band has been found by Mr. Prestwick to expand into a series which he names the Thanet sands.

East Woodhay, passing one mile and a half north of Basingstoke, bisecting Odiham, and leaving the county at Aldershot, will separate this district from that of the chalk.

On the higher portions of this region, and indeed throughout it, lie extensive areas of the Upper Bagshot and Bracklesham beds. Such are Penwood, Newton, and Burghclere Commons, Frith Common, the large block consisting of Tadley and Silchester Commons, Pamber and West Heath, and the yet more extensive heaths and commons about Hartford Bridge Flats. The mass of the land out of which these patches rise, underlying and surrounding them, is the London and plastic clay, which also borders throughout its course the chalk. I estimate this northern Eocene district at 180 square miles.

To this succeeds, southwards, the great mass of chalk, here uniting the North and South Downs, and the Alton Hills.

Much gravel caps the hills to the north and west of Alton. To the east of Alton, and for the most part in the valley of the Rother, appear the Upper Greensand, rather yellow and ochraceous than green, and the Gault, a chalky clay. The Upper Greensand also appears in a patch about Burghclere, Sidmonton, and Apshanger.

The clay is found in the chalk district covering the hill tops. The chalk also invades the clay to the south, rising out of it in the outlier of Portsdown, north of Langston and Portsmouth Harbours.

I estimate the central chalk plateau, including Portsdown (14 square miles), at 760 square miles.

Another lower and middle Eocene district extends in a broad band, south of the chalk to the sea, its upper line here being very nearly, indeed curiously, parallel to its lower line in the north.

The London and plastic clay again borders the chalk along the whole line, cropping out round the outlier of Portsdown. The chief mass of it, however, lies east of the Titchfield Brook to the boundary of the county, and between the chalk of the South Downs on the north, and that of Portsdown on the south. This valley will again be mentioned.

There succeed, first, the Lower Bagshots, a narrow strip, and then the Bracklesham beds. These last are extended over a considerable surface, from the west at Romsey, along the Southampton Water, to the east at Portsmouth. Their chief development is north of the Southampton Water and west of the Hamble, where they form a continuous block (only intersected by the alluvium of the river Itchen) of 75 square miles.

The outlying New Forest block consists of more recent and unprofitable deposits. This tract appears to the ordinary observer, at first sight, to be a mixed mass of clays, marls, sands, and gravels. The apparent confusion arises from the variety of the strata, from the confined space in which they are deposited, and from the manner in which, on the numerous hills and knolls, they overlie one another, or are concealed by drift gravel. On closer examination, it is found that in the southern part the Headon and Osborne beds prevail, and extend westward from Beaulieu Heath to Hordle Cliff, where the sea flows over them, to appear again, as we shall see, on the opposite coast of the Isle of Wight. A little farther north, a belt of Upper Bagshot sands occurs, then a belt of Barton clay, then the Bracklesham, and the Upper Bagshot beds. The same phenomena may be put in another shape. Suppose a triangle, the base of which is longer than either of its sides, and runs along the seashore from Southampton Water to Hordle Cliff, while the irregular sides meet a little north of Lyndhurst. This triangle is composed of the Headon and Osborne beds, and the two sides of it are surrounded east, north, and west by successive, but irregular borderings of, first, Bagshot sands, then Barton clay, then Bracklesham beds.

I estimate this southern Eocene district, including the New Forest block, at 576 square miles.

The measurements of the three geological areas are therefore, northern Eocene, 180 square miles; southern, 576; central chalk, 760; in all 1516 square miles.

2. *Physical Features.*

A pedestrian, who would trace the main watershed line of this county, would begin his walk at Inkpen Beacon, in the North Downs, and end it at Butser Hill, in the South Downs, connecting the two by the Alton Hills, which run between Odiham and Petersfield.

Inkpen Beacon, the monarch of English chalk mountains, 972·8 feet high, though not actually in the county, yet standing on its very confines at its north-western extremity, where Hants, Wilts, and Berks meet, may well be taken as the starting post. Thence the route is eastward and south-eastward, along the high downs to Highclere Beacon, 870·4 feet, Ladle Hill, White Hill, Cottington's Hill, Rook's Down; thence southward, with an inclination sometimes of a few points to the east, over Basingstoke Down, Tunworth Down, Binstead Hill, Windmill Hill, Nore Hill, Butser Hill, 882·6 feet,* and so out of the county, at its south-eastern extremity, about ten miles from the coast.

To trace the short line of watershed between the valleys of the

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* These heights are lower than those usually given, but my figures are derived from trigonometrical observations by the Ordnance Survey Department, and have kindly been supplied to me by Lieut.-Col. Cameron, R.E.

Wey and the Rother, our pedestrian would branch off due eastward over Nore [*] and White Hills for about six miles.

Lastly, there is a low and insignificant range of heights, sufficient, however, for their purpose, which divide the waters falling into the Southampton Water from those which descend to the south-western sea-coast. These last belong to the Bagshot beds.

Over all the other watersheds, our traveller's feet would be on the chalk for the whole distance; first whilst walking south-eastward for 22 miles over the North Downs, then southward for 16 over the Alton Hills, till he joined the South Downs at Butser Hill. But he would still have left untraversed the outlier called Portsdown Hill, as well as the South Down range in its extension to the north-west from Butser Hill, by St. Catherine's Hill, Sombourn, Stockbridge, and Tidworth. It is worthy of remark, that in this county the North Downs form a watershed, which is not the case with the chalk generally, nor with the North Downs in other counties, where they are broken through by the rivers Wey (rising in the lower range of the Alton Hills), Mole, Darent, Medway, and Stour; while the South Downs are pierced in Hants by the Test and the Itchen, and elsewhere by the Arun, the Adur, the Ouse, and the Cuckmere.[†]

There are four systems of drainage—river basins—in the mainland of the county: the London, the Arun, the Southampton Water, and that of the south-western sea-coast.

The two first our traveller had, as he came southward, successively on his left; the third continuously on his right.

The London or Northern basin is watered by the Emborne River (an affluent of the Kennet, which receives several brooks from Highclere, Kingsclere, and Banghurst, beginning in the north-western extremity of the county, and also bounding it for 12 miles); by the Loddon (rising 1½ miles to the west of Basingstoke, and flowing through that town); by the Whitewater; and by the Blackwater (rising near Aldershot in the extreme east of the county, which it bounds till its junction with the Whitewater, for 20 miles). All these rise on the northern slope of the North Downs, and ultimately find their way into the Thames. There would also be seen on the eastern slope of the Alton Hills, about 2 miles south-east of Alton, the two sources of the Wey, watering the valleys of Selborne and Alton. The main river of the Wey reaches the same basin, by a most irregular course, in search of a convenient spot at which to pierce the North Down range, and which it at last finds round the Hog's Back at Guildford. I estimate the country thus drained into the London or northern basin, at 275 square miles.

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[*] Var Down is substituted in the Ordnance map for Nore Hill, which, however, is a classical name, and cannot be sacrificed. "Nore Hill, a noble chalk promontory, remarkable for sending forth two streams into two different seas. The one to the south becomes a branch of the Arun, running to Arundel, and so falling into the British Channel; the other to the north, the Selborne stream, makes one branch of the Wey, and meeting the Black-down stream at Hedleigh, and the Alton and Farnham stream at Tilfordbridge, swells into a considerable river, navigable at Godalming; from whence it passes to Guildford, and so into the Thames at Weybridge; and thus at the Nore into the German Ocean." *Gilbert White's Selborne*, Part I. Letter 1.

[†] From the fact that the gorges of the North and South Downs are often in the same line, these transverse fissures have been ascribed to the upheaving force exerted on the intervening weald. In Hants there is no weald, and consequently the North Down is not fractured. See Mr. Martin's 'Geology of Western Sussex,' quoted by Lyell.

The country drained to the south-eastward, into the basin of the Arun, by the Rother rising on the eastern slope of Nore Hill, I estimate at 45 square miles.

The whole of the remainder of the county drains to the southward (and so is on the sunny side of the hill), the great bulk of it into the Southampton Water, chiefly by means of the Test or Anton * and its affluents, and the Itchen.

The Test itself rises 5½ miles north of Andover, near Upton, on the southern slope of the North Downs, and, running to the east and south, is joined below Hurstbourne Priors by a stream from Ash, and further down by another small stream (also running from the eastward, from Micheldever) at Newton Stacey. The Anton rises at Enham Knights, is joined by a rivulet from Charlton, 2 miles north of Andover, and by another brook, before it joins the Test at Kitecombe Bridge, at the foot of Longstock Hill.

The two rivers, the Test and the Anton, sometimes divided into two or more channels, sometimes united,

> "Like friends once parted,
> Grown single-hearted,
> Ply their watery tasks"

in a tolerably straight course southward, through one valley, draining the country on both sides into the head of the Southampton Water at Redbridge, after a course of 35 miles. They receive slender contributions on either side from different brooks, from Broughton and the Wallops, from King's Sombourne, the Tytherleys, and Knap Hill. Below Romsey there are other waters, from East and West Wellow, joining near Nutshalling; from Rufus' Stone and from Minstead, joining near Eling, on the western; and from Milbrook on the eastern bank. The Test

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* Which name ought to be given to the united stream is hard to say. Camden contends for Anton; and the names of the county, and of the town at the mouth, seem to favour his opinion. On the other hand, Leland speaks of the Test only, which has, moreover, an Anglo-Saxon derivation. Present usage is utterly undecided between the two.

and Anton cut their way, through an alluvium of their own making, between the chalk hills as far as Kembridge Mill, above Romsey, where they enter the Eocene deposits.

The Itchen, said to have its source in the pond at Alresford (constructed by De Lucy, bishop of Winchester, in the latter end of the twelfth century), increased by rivulets from Bishop's Sutton and Bighton, receiving contributions on the right and left banks from the valley of the Candovers, from that of Cheriton and Titchbourne, flowing sometimes by no less than five channels, as at Winchester (the work of ecclesiastical improving agriculturists probably), sometimes by one, as at St. Cross just below, having various affluents from Otterbourne, Marwell, Durley, Hursley, and North Stoneham, reaches the Southampton Water, after a course of about 25 miles. The Itchen leaves the chalk, and enters the Eocene, between Otterbourne and Bambridge.

The villages on the banks of these chalk streams are the homes of the great bulk of the agricultural population in the district.

Next, to the east, succeeds the Hamble, mostly an estuary, through the Eocene. Its two branches rise at Durley and Bishop's Waltham, and it flows by Botley and Bursledon with a course of 12 miles.

A nameless stream, east of the Hamble, which I venture to call the Titchfield Brook, rises in the chalk about 2 miles west of Butser Hill, enters the Eocene at Soberton Heath, and runs into the Solent, after a course of 20 miles.

I estimate the Southampton Water basin at 906 square miles.

Passing now to the outlying block in the south-west, where low watersheds separate, from each other, streams nearly parallel in their channels. Here the Dark Water, the Exe or Beaulieu, 13 miles long, the Lymington Water, 15 miles, the Avon Water, all drain the New Forest into the sea at the south; and lastly the Wiltshire Avon runs directly south, from Breamore to Christ Church, for 20 miles.

This basin I estimate at 300 square miles.

The collected measurements of these drainage areas are: London basin 275, Arun 45, Southampton Water 906, West Coast 300 square miles; in all 1516 square miles.

II. "THE NATURE OF THE SOILS IN THE DIFFERENT DISTRICTS OR NATURAL DIVISIONS OF THE COUNTY."

The statements already made as to the geological character of the rocks in the county, and the physical configuration of its surface, will be our guides in dividing it into certain natural districts for agricultural purposes, and in ascertaining the quality of their respective soils.

Under this guidance, however, many anomalies will present themselves to our notice, because the distribution of the soil has ever been determined by the flow of the water, which has itself been regulated by the height and direction of the mountain ranges. But the changes of the watersheds have been so complete, the physical geography has been so repeatedly disturbed, the drainage has been so often arranged and rearranged, that we find in this county, both on the mainland and in the island, the erratic tertiaries capping the chalk hills, where, according to any existing surface-configuration, they certainly never could have wandered. The county, therefore, can be but roughly mapped out.

Minute distinctions, or much accuracy, are not to be expected. The boundaries assigned to each district are, from the necessity of the case, loosely delineated, and must be accepted with large allowances and some modification. Where two different geological series are near neighbours, as when the chalk and Eocene meet, or where the soil has been deposited on a flat or slight incline, the one formation runs up or down into the other, and the confusion of materials is infinite, even within the compass of a single field.

Taking a geological basis as, on the whole, the most unexceptionable, we may say there are three natural districts: 1. The Northern Eocene, or "the Hampshire Woodlands," according to the local name. 2. The Middle Cretaceous. 3. The Southern Eocene. Of the soils in these districts a triple division must suffice, though in some cases it may be hard to determine to which of these three kinds a particular field should be assigned; because a larger subdivision would often create distinctions, where no real broad difference exists.

The general classification in the Eocene districts, north and south, will be: 1. Retentive clay and clay-loams. 2. Sands, gravels, and loams mixed with them, on a retentive base. 3. The same on an absorbent base. The two first require for their improvement, close draining, and then subsoiling (but not bringing the clay to the surface). All three require, as a mineral manure, *chalk*, *chalk*, *chalk*. "The salvation of these soils is chalk," has often been said to me. The base of the whole is a plastic clay, like birdlime. The nearer this is to the surface, of course the wetter the soil.

In the *Northern Eocene*, one may say of No. 1 that it is a strong soil, but requires to be well "tackled," and is utterly intractable without improvement by drainage and chalking; and even then its cultivation is a work of difficulty, requiring much patience and perseverance. Where it is most fertile, its materials are better mixed, and its colour is darker. The clay, the loam, and the sand, instead of lying in separate beds, as they too often do, are so intimately blended, that each corrects the bad qualities and supplies the deficiencies of the other. The better sort may consist above of sandy clays, or loams, gradually passing downwards into stronger and stiffer clay, till you come to the London and plastic clay at the bottom. Some of the strongest and best of this land occupies what is locally called the "Hampshire basin," an alluvial formation, once a small inland sea, situated chiefly in the parishes of Basing and Sherfield, and intersected by the Berks and Hants Railway, in the cuttings of which many marine-shells were found. Oaks grow well everywhere in this soil; elms may be seen in the more generous parts: all of it once was, and much of it still is, in wood, either in hedgerows or coppices, so that it well deserves the name of "the Hampshire Woodlands." Whether under cultivation or timbered, this No. 1 soil extends throughout the whole of the northern district as a sea, out of which rise islands of furze and heath on commons, and fir plantations. One group of these is to the north of Highclere; another and larger block runs north of Monks' Sherborne, till you come to the continent of Hartford Flats and Aldershot. These are the Nos. 2 and 3 soils in the north, belonging geologically to the Bagshot and Bracklesham beds. Here you have the erratic gravel between the surface-soil and the clay; there the sand; there the two mixed; there no vegetable surface-mould whatever. About Bramley is some of the best-tempered of these soils—a free working loam, good for all corn. About Pamber and Silchester there is much sharp and unprofitable gravel on the surface; but the better parts are good barley land. The same may be said of West Heath, Banghurst, and Tadley. At Silchester, the Blackwater valley, about Yately, Bramshill, Eversley, and indeed throughout the Bagshot sands, there occur in spots blocks of concrete, cemented gravel, clay, and iron, *Hamptonicè* "verrells" or "ferrells," on the derivation of which word I have in vain consulted one of the first Anglo-Saxon philologists of the day. Its perfectly intelligible synonyme is "plum-puddings." They were found, on its restoration a few years since, built into the foundations of old Sandhurst church.

In the *Southern Eocene*, if we start from the point where the Salisbury branch of the South-Western Railway enters the western boundary of the county, and proceed eastward, we have, north of Romsey, No. 1 soil skirting the chalk all the way, by Otterbourn and Bishop's Waltham, to the eastern boundary of the county, where the Portsmouth and Brighton Railway leaves it, at Havant and Emsworth; this border being narrow towards the west, but gradually increasing in breadth towards the east, and nearly encircling the Portsdown chalk. Fareham is situated within it, Portsea and Hayling belong to it. Here are Spinewell Wood, Butler's Wood, Amfield Wood, Cranbury Park, Bambridge and part of Twyford Park, Stroud's Wood, Waltham Chace, the Forest of Bere, and, west of Portsdown Hill, Ridge and other coppices. It is almost a continuous line of wood and coppice. This country ought to be called "the South Hants Woodlands." This No. 1 soil is heavy indeed and dark coloured, but in its better parts, where mixed with a sandy loam and a reddish brick-earth, it forms rich loam. The good soil increases in breadth of surface, and the loam in depth, as you go eastward, and approach the coast and the valleys opening out on it. To this tract of country belongs that heavy ground, which has already been mentioned, between the chalk of the South Downs and that of Portsdown.

The southern slope of Portsdown, and the alluvial soil stretching thence towards the sea, is of much better quality. From Bedhampton, at the eastern end of the hill, to Fareham, at the western, there is a fine tract of corn land, nearly eight miles long, and with an average breadth of nearly one, which for good farming, large open pleasant fields, and the earliness of its produce (the harvest is said to be ten days in advance of other parts), is not surpassed in the county, except it be at Bishopstoke.

Much serviceable land is situated to the east of the Southampton Water, stretching in a broad band from Romsey, south and eastward, in what may be called the Bracklesham country, as far as Gosport and Portsmouth; but the extension southward is soon checked by the poor soils of the New Forest block. The constituents of the soil do not seem very different from those of lands of this class in the north, but are better mixed. There are some fields with a good staple between Botley and Bishopstoke; some much thinner about Netley, Horton, and Chilworth; but the large proportion of this block is, as soils go in Hampshire, very useful land. Titchfield, for instance, is a noted agricultural parish. About Romsey, in the valley of the Test, there is a rich black alluvial soil, peaty perhaps in parts, of which some field-allotment gardeners appear to make good use. But some of the best working land in this whole district, and it may be almost said in the county, lies in the adjoining valley of the Itchen, about Bishopstoke Railway station. The farmer has there a loam, as deep as the plough can go, resting on a gravelly subsoil, excellent for all grain, strong enough for beans, and light enough for turnips. This loam thins out to the southward in the direction of Millbrook, Southampton, and Netley Abbey, till the gravel comes to the surface. It was about midway in this tract, between Bishopstoke and Southampton, at Swathling, that the trial of the light-land implements took place, on the occasion of the Society's show in 1844.

The New Forest portion of the south-western block is more or less overspread with beds of erratic flint gravel, generally yellow, sometimes of a darker colour. Where this is deep, it obliterates the underlying sands and clays of the Eocene period. This remark applies, though to a less extent, to the north-eastern portion of the county about Aldershot. In the Forest, too, reappear the "varrells," though they are known by another name —"Burley rock"—derived from the spot where they crop out. They are again to be found built into the walls of ancient buildings, such as the Norman churches of Boldre and Brockenhurst, and the Early English church of Minstead. Of the New Forest, the Rhinefield, Burley, and Wilverley walks, in the western district, are the poorest; though, of the Rhinefield, the part where the Nursery is situated is better. Of the Burley walk, the part to the west of Burley Beacon, and round it, is nothing but sand on clay, growing rushes, with here and there some bed furze. In the eastern district the poorest walks are the Beaulieu, the Nodes, and the Denny. These are all to the south, and generally the north has a deeper soil, more capable of growing oak. There are two kinds of furze in the Forest—the tall, and the short or "bed" furze. Farmers will tell you that the land is worth reclaiming, and corn can be grown where the tall furze flourishes. The Forest soil used to be famous for its marls, two descriptions of which are recognised—"the Shell Marl" and the "Cherry Marl." In the former the clay is rendered calcareous by shells, whole, or slightly broken. In the latter, which derives its name from the red stains caused by oxide of iron, the shells are wholly broken, and the calcareous and argillaceous materials more intimately united. The large and numerous marl-pits still existing, of which no less than twenty-four are named in the 'Schedule to the Register of decisions on New Forest claims, 1857,' as "open and accustomed marl-pits," prove the extensive use of this manure in former, and even comparatively recent times. They are now, however, almost deserted. "The old hole," near Levett's Gate, is sometimes resorted to; but it appears from the New Forest financial accounts that, during the year ending the 31st of March last, no more than 138 cubic yards were excavated from all the twenty-four pits.* Marl is a most bulky, and therefore a most expensive manure to apply; chalk, conveyed by railway, and artificial manures, easily carried anywhere, have superseded it. The chief application of marl is on the peaty soil between Sopley and Christchurch. In the New Forest, from the recent formation of the deposits, geology can give a good account of the soils. Thus—to connect the statement with the geological description before given—the Headon and Osborne beds, at the basis of the triangle, consist of heavy brick-earth and clay, of which the Beaulieu white bricks are made, the tops of the hills being capped with gravel. The upper Bagshots, about Burley Beacon, round by Rhinefield and Denny Lodges, and so on towards Fawley, are hungry sands devoid of staple. At Fawley itself there is a considerable improvement. The Barton clay next succeeding to the north, and coming out on the Southampton Water at Dibden, is the oak and timber soil. This clay is blue in its original state, yellow when weathered.

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* The sum received for marl, at 6*d.* per cubic yard, was 3*l.* 9*s.* Some calculations have been printed in the Society's Journal as to the cost of these marls when conveyed by railway.

In the extreme south-west of the county the soil is alluvial in the valleys of the two rivers there (the Avon and Stour), peaty below Ringwood in the basin of the Avon; but on the higher ground towards the Forest, between Ringwood and Christchurch, there is some of the best natural soil for turnips in the county. The eminences by the Stour, and thence towards Poole, are capped with extensive beds of gravel.

In the middle or cretaceous district soils are also threefold: 1. A strong clay on the tops of the hills. 2. A thin chalky surface on their abraded sides. 3. An alluvial deposit in the long watered valleys.* The basis of all is what is locally termed "the chalk rock," in the upper layers of which there are cavities —"pot-holes,"—filled with drift clay, loam, and flints, as may be seen in any railway cutting. That a strong, stiff, loamy clay, in many places 20 feet deep, an evident aqueous deposit (but whether of the same geological character as the plastic and London clays in the Eocene districts north and south, geologists differ), should crown the hills, is the distinguishing feature of soils in the chalk country. As to the fact itself, Golonel George Greenwood writes:—"On the hill-tops the clay may be said to be continuous, north and south, from the tertiary strata of the London basin at Old Basing, to the Hampshire basin at Horndean, by Herriard, Bradley, the Wealds, Medstead, Rotherfield, Basing Park, Froxfield, Henwood, Old Winchester Hill, Butser Hill, Charlton Down, and Catherington." †

So also from west to east, from Winchester to Nore Hill, along the upper valley of the Itchen, the hill-tops at Hampage, at Fulley Wood, beyond Titchbourne, between Titchbourne

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* I am aware of the more multifarious division of chalk soils, but I must express my conviction, founded on personal observation and inquiry, that such a description is not generic, and is only partially applicable. The triple division above is that which any chalk farmer in Hants, from Combe to Charlton, will give as the result of his experience. "Light hazel mould" is a designation frequently mentioned in print, but is applicable rather to Sussex than to Hants.

† Letter to 'Hampshire Chronicle,' 21st January, 1859.

Down and Sutton Scrubs, at Chalwood, West Tisted, Privet, and Colemore, are all covered with clay, which, indeed, is almost continuous for the whole distance.

Again, in the north-west, and coming southwards towards Andover, there is strong good wheat-land at Netherton, Hurstbourne, Tarrant, Apsley Farm, Falconer's Down Farm, and then going east towards Basingstoke, till the former line from Old Basing southwards is touched at Steventon, North Waltham, Dummer, and Farleigh. In a north-westerly direction from Winchester to Chilbolton, the agricultural soil is thin, the chalk being near the surface: so also still further to the north-west in the Weyhill country. A little beyond, north-west of Tidworth, just over the county boundary, is the isolated conical chalk hill of Sidbury, the table-top of which is a marked instance of the drift covering (here remaining *in situ*) of clay, loam, sand, and gravel, which once overlay all the chalk formation.

A red brick colour often belongs to this clay loam, and to the chalk immediately beneath it. This discoloration, caused by oxide of iron, depends on the superposition (in some remote period) of gravel (traces of which in the presence of flints now remain), and on elevation rather than on locality. It is, however, particularly observable about Andover, and has indeed given their names to such places as Redenham and Red Rice. The sheep always do well on these red lands, though the wool suffers in colour and in price.

Though this is a cold, it is not a wet soil. If the deposit of clay were not invariably on the top, springs would burst out of every hill-side, and brooks would flow through each hollow. But the capabilities of the porous chalk rock for absorbing moisture are seldom overtasked, and a "winter-bourne" is the utmost result of long-continued rain, and of converging undulations of ground. Well-diggers are obliged to go two or three hundred feet deep: and, whether the shepherd requires water for his own use, or for that of his flock, it comes from the clouds and not from the springs. Between the lands on the arable ground there are, except on the clay capping, no water-furrows, and between the fields no water-ditches; and, except when the rain is actually falling the surface is not wet and the roads not dirty.

Then, again, though it is a hard, it is not a dry soil. However thin, it does not burn like sand. There is no apparent wetness, and yet there must be a remarkable power of retaining moisture even in the driest time. The streams must be supplied from fountains deep down in the bowels of the earth, for their volume is but slightly affected by summer's drought or winter's rains, and, if fouled for a time by washings from the upper grounds, they very soon return to their normal transparent clearness.

Though neither wet nor dry, this table-land is, as might be supposed from its composition, a very tenacious soil. The remedy is happily close at hand, just beneath. "Wells" are sunk through the clay, and chalk brought up and spread abroad for the frosts to pulverise. The cost is 40*s.* per acre; the effects are larger crops, and more healthy land.

The No. 2 soil, on the sides of the hills, is little more than chalky rubble, or chalk finely comminuted and decomposed by atmospheric action. Residents of much experience, without offering any explanation, have remarked that the soil is stronger on the northern than on the southern slopes.* The chalk, where weaker, is of a grey or whitey-brown colour, thin, and wanting in cohesion. For instance, when reduced to a fine tilth for turnips, the rain, in a dry season, seems to go through it, and to make no show, although chalk never burns.

Flints appear in both these soils, either lying dispersedly, mixed with gravel and pebbles, or intersecting without interruption, in regular horizontal strata, the upper chalk formation. So thick is the flint-drift, spread like a coverlet on a bed of chalk, in some of the dry hollows, that cultivation would seem as little profitable there as on the shingle of a sea-beach. But you are reassured when told of the costly experience of a new-comer, who, having picked off the flints and carted them away, and thereby lost his crops, acknowledged his error by restoring them, as shelter against March winds, protection against summer suns, and warmth against winter frosts.

The alluvial deposits (No. 3 soil) are considerable tracts of meadow and pasture (involving distinct agricultural management) in the valleys through which the streams flow. Such are the soils on the banks of the Stour and the Avon, in the south-western portion of the southern district; and of the Test and Anton and the Itchen, partly in the middle, partly in the southern district. The alluvial soil, though part of it is transported from a distance, derives its chief characteristics from the hills above and beside it, and so varies with the formations through which the rivers flow. The detrital accumulations, combined with vegetable matter arising from the flow and the stagnation of the water, compose the dark-coloured surface. Where the current is slow and the valleys large, peat and peaty soils have been formed. The distinction is important. It bears directly on "the character of the farming" in those valleys, as will be seen when this topic occurs. The commencement of the peat is the termination of the more profitable water-meadows.

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* One explanation that has been given me is, that the movement which occasioned the existing surface configuration was from south-east to north-west; and that consequently the rolled combinations of chalk and clay settled down on the northern or leeward side. This theory fits the facts, almost as well as if it were made for them.

The appropriation of these three soils to different purposes of rural economy is distinct. Where the clay is deep, there are often large woods on the tops of the hills, and often numerous corn-fields; where the upper soil is so thin as to let the plough down to the chalk, there used to be nothing but down, though much of it is now broken up. Where the long watered valleys run, there are the ancient churches, the villages, the farm-houses, sheltered by the tall elms and ashes, which in their turn shelter the rooks, and that which has attracted them all hither—the water and the water-meadows.

A district which lies to the eastward still remains to be described. Geologically it is assigned to the cretaceous group, as having a zoological connection with the chalk above it; its mineral constitution, however, is distinct, for it has no more than 2 per cent. of lime in its composition, whereas chalk has 50 per cent. In an agricultural point of view, it more nearly resembles the Wealden clay beneath. The gault and greensand extend from Petersfield in the south, by Selborne, Worldham, Alton, Binstead, Bentley, to Farnham in Surrey. This is the hop country: excellent, also, when drained, for wheat, beans, oats, and root-crops, growing, in its natural undrained state, large oaks.

These soils present many varieties. There are—belonging respectively to the lower and middle gault —clays, compact and stiff, sometimes shale-like, of a blackish or grey colour, requiring draining, extensively used as an alterative manure to light sandy and gravelly soils if near, which they benefit, partly by communicating mineral ingredients deficient in those soils, partly by mechanically consolidating them, and so rendering them more retentive of atmospheric influences and of manure. Distinguished from these, there are marls, from 20 to 100 feet thick, green, yellowish, grey, dirty white, valuable in themselves, valuable as manures, and excavated for this purpose from very early times.

This is the country of the "malm," suitable for hops, or indeed for any crop requiring a strong soil; not so stiff and tenacious as the preceding gault clays, falling to a fine powder on exposure to the air, running frequently into the fissures of the firestone rock, filling them with a rich unctuous mould, into which the roots of the hop penetrate 20 feet deep. The malm farmers say that the application of lime once in ten years, 160 bushels to an acre, is of great service, not only in increasing the crop of wheat, which is highly esteemed and largely exported for seed, but also in stiffening the straw—a most valuable quality on strong rich land. But this is the effect of lime anywhere.

There is yet another variety lying in beds mixed with the clay, which has received the name of the "silica rock," from the quantity of soluble silica which was found in it by Messrs. Way and Paine. From Farnham to Petersfield (where there is a section 40 feet thick) this rock extends over some hundreds of acres, reaching to a depth of from 50 to 100 feet, nearly the whole being under hop cultivation, but capable of growing wheat, beans, or anything. It occurs again about Selborne, and may be traced at the Undercliff, Isle of Wight, in its proper geological position between the chalk above and the gault below. In appearance it is whitey-brown, not unlike a rich limestone, and in touch is soft. It is quarried for manure, and is itself benefited by a dressing of gault.

A part of this eastern district has been described by the hand of a master. In the village of Selborne, was born, lived, and died, Gilbert White, of whose topographical sketch a portion is directly to our present purpose. "The cartway of the village," he says, "divides in a remarkable manner two very incongruous soils. To the south-west is a rank clay that requires the labour of years to render it mellow [upper gault]; while the gardens to the north-east and small enclosures behind consist of a warm, forward, crumbling mould, called 'black malm,' which seems highly saturated with vegetable and animal manure [lower gault, which here happens to be naturally drained]. To the north-west, north, and east of the village is a range of fair enclosures, consisting of what is called 'white malm,' a sort of rotten or rubble stone, which, when turned up to the frost and rain, moulders to pieces and becomes manure to itself." "Still on to the north-east, and a step lower, is a kind of white land, neither chalk nor clay, neither fit for pasture nor for the plough, yet kindly for hops, which root deep into the freestone. This white soil produces the brightest hops." These last are what we should term different kinds of marl, and are above the freestone or firestone (as it is indifferently called, from its easiness to work, and from the uses to which it is applied). Speaking of the two forests in the parish, "Wolmer, with her sister forest Ayles Holt, *alias* Alice Holt,"* he says, "though they are only parted by a narrow range of enclosures, yet no two soils can be more different: for the Holt consists of a strong loam, of a miry nature, carrying a good turf, and abounding with oaks that grow to be large timber; while Wolmer is nothing but a hungry, sandy, barren waste."

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* The orthography of this forest is various. Gilbert White writes Ayles, *alias* Alice Holt; an inquisition 36 Edward III. (1362) has Aisholt; the Ordnance Survey prints Alder Holt. Holt is the hill-wood, Alice may be a corruption of Ayles, but Aish cannot be; aspirates and liquids would not be interchanged. Ayles and Aish are two names, etymologically distinct. Ayles Holt is the *eagle's* hill-wood (as Aylesbury is the *eagle's*-bury); Aish-holt is the *ash* hill-wood; Alder

It should be observed that, in all the districts, extensive beds of flint, gravel, and sand are to be met with at all levels, from that of the sea, to 500 or 600 feet above it. They are found, where one would least expect to meet with such driftable substances, on the tops of the chalk hills, as to the west and north of Alton in the north-east, and about Romsey in the south-west; and again, as we shall see hereafter, in the Isle of Wight. They occasion that difference, which Gilbert White remarked, between the two neighbouring forests of Wolmer and Alice Holt, making the former "a hungry, sandy, barren waste." They occur also on each eminence of the Eocene region, both in the north and south. They form terraces in the valleys of the existing rivers, some 25 feet above the alluvial meadows, through which the streams now flow, the gravel varying in depth from 2 feet to 60.

III.—"CHARACTER OF FARMING, LIVE STOCK, IMPLEMENTS, RECENT CHANGES OF FARM MANAGEMENT, IMPROVEMENTS LATELY INTRODUCED OR STILL REQUIRED, REMARKABLE OR CHARACTERISTIC FARMS IN EACH OF THE DIFFERENT NATURAL DIVISIONS."*

The farming on every side of Hants has been described in the Society's Journal. Dorset, Wilts, Berks, Surrey, Sussex—all the surrounding counties from sea to sea, and similar in many particulars of their agricultural character—have each of them been fully delineated. The report on Hants has thus been, in a great measure, anticipated. Farming on lands, light, heavy, and

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Holt, the hill-wood where the alders grow, is probably the same word as Aldershot.

* The six prescribed topics at the head of this section would appear capable of convenient treatment, under each of the natural divisions. I venture, accordingly, to group them together, passing, as will be easily noticed, in order, but without noting the transition, from one to the other. I comprehend under "the character of the farming," the size of farms, the proportion of arable, pasture, and meadow; the rotation of crops; the mode of cultivation, the application of manures (whether farmyard, artificial, or chalk), the produce per acre, the live stock, with the number per acre; the implements, the buildings; the chief markets and fairs; the societies for the improvement of agriculture, and the encouragement of the labourer, the wages and condition of the labourer; the manual labour per acre; the tithe, the parochial burdens, and rent of land, with its tenancy The topics "recent changes in farm management," and "improvements lately introduced," will be mentioned in connexion with "remarkable or characteristic farms," which are indeed the scenes and examples of these "changes" and "improvements." The "improvements still required," will be reserved for separate enumeration and consideration under a distinct head.

mixed; downs, water-meadows, reclamation of wastes, improvement of poor soils, have all been so fully and so ably discussed, that the reporter on Hants must submit to the imputation of saying again, what has been better said before. But my repetitions, whatever they are, at least are those of an eye-witness. Every detail is the result of personal inquiry, or has been under the personal observation of the writer, who has traversed, with a special view to this Report, the length and breadth of the county, noting and narrating what he saw and heard.

A more unfavourable time for making agricultural observations there could not be. We have just gone through one of the wettest, coldest, and most ungenial seasons on record. The spring was remarkable for its backwardness; during the summer there was a succession of heavy rains and storms of wind, with but little sun and no heat. The seasons were out of course. Summer heat and winter cold were identical in temperature. At 5 P.M. on 6th of August the thermometer, at Newark, stood at 54°; on 6th of December, at 6 P.M., it was only two degrees lower. During the whole of the summer and autumn, there were just ten days for haymaking, and the same number for wheat harvest. Turnips and all roots were only half a crop, and only half cleaned in spite of repeated hoeings and much expense. The consequences pervade the whole agricultural system. The land is foul, the flocks are poor. No one class of farmers has escaped. The lowland occupier, who has had his meadows unseasonably summer-flooded, and his grass filled with grist, so that nothing will touch it either standing or cut, envies his brothers on the downs—*laudat diversa sequentes;* but they, having bad hay, poor sainfoin, and no turnips, have sold their sheep at a great sacrifice, or else have double stocks on their hands with half their usual quantity of feed. Heavy-land farmers have not been able to get on their fields. A dry day now and then simply showed them that the ground would not work. Where the seed has been got in, the soil was not pulverised, and the grain not well covered. It has since had to endure a succession of severe frosts. Those who waited, are likely to have as good a plant, or better, than those who hurried the seed in earlier, after a fashion.

NORTHERN DISTRICT.

This is too heavily timbered for agricultural purposes. The double rows of timber-trees, with brushwood between, growing in the enormous hedgerows which enclose arable fields in some of the strongest land, right and left of the Loddon, are hardly to be equalled elsewhere. These, pernicious enough to cultivation anywhere, are here doubly injurious from the nature of the soil, which requires the fullest possible amount of light and air. Few strangers make trial of the unimproved farms of this country. The occupier is born in it, and is well called "the woodland farmer." You may hear the phrase, "He will do for this country, but he's worth nothing on the hills." His doing is but indifferent even here. He is not a man of much capital; his farm is small, from 50 to 100 acres, chiefly arable, with the exception of some wet fat meadows adjoining the Loddon; his practice may be described in a few words: fallow once in seven years, then crop as fast as possible. His rotation is short and simple: wheat and beans alternately for six years; then a fallow, generally an open fallow; now sometimes, however, with vetches, which are found to loosen the land. There may be variations according to the season: for instance, the wheat could not be got in last fall, so that oats will have to be substituted. In fact, seasons and circumstances must overrule systems in this country; and this is understood by the landlords, who do not interfere with a mode of cultivation which is not altogether in accordance with approved principles.

In the fallow year the land is deeply ploughed in the autumn, allowed to lie during the winter, in the spring (as soon as it will bear treading) crossed or turned back according to circumstances, and then ploughed three or four times during the summer and got to a fine tilth. Crossing is now much more in use than formerly; on undrained land it was hardly ever done. Grubbers are not generally used; but drags to get out the couch, and Crosskill's crusher (where available) to break the clods, which, if the land be ploughed when wet, are dried into brickbats, with edges so sharp, that the hair is shaved from the horses' legs, and the ploughman compelled to hitch off his team, and await some softening showers. But there is not so much open fallow by one-third now, as before draining was introduced. This improvement has also rendered it possible to put in vetches, and even, on the more favoured spots, swedes and mangold, and, once in eight years, a little clover. If the clover-ley be clean, it comes into wheat; but it is more generally fallowed, or a crop of oats or beans taken, and then a fallow. The farmer here does not depend on stock, or want much food for them; indeed, before draining, sheep-folding is an impossibility. The processes of cultivation must be completed within the day. "Plough a bit, harrow a bit, and then sow before nightfall, or the rain may come and 'set it' all." Manure (ploughed in green) is applied to the wheat or to the beans, just as the season permits carting on the land. I could not learn that there was even a preference for its application to the bean-crop; but only, that if it were applied to the one, it was not applied to the other. The beans are spring beans, the winter variety failing from the frost; they are dibbled by women, across the lands, often on the stale furrow, sometimes after a second ploughing; and are twice hand-hoed. The bean-stubble is ploughed, the weeds dragged up and burnt. The wheat is sown broadcast, two bushels to an acre, on a single earth generally, and before November, if possible. Trump and Essex rough chaff, both white wheats, are the favourites. The produce under this system is 24 bushels of wheat, and 28 of beans, per acre. The great difficulty in growing wheat on these heavy lands, is to get the crop to stand. If the manuring be generous, or if the spring and summer be wet, the straw becomes long, and the wheat is laid; if, on the other hand, the farmer be sparing of his dung, his harvest is not remunerative. The straw of the red wheats is stiffer than that of the white, but the grain is coarser, and the millers will not buy it so readily.

For live stock, the "woodland farmer" buys in a few tegs, half starves them, and sells them out again the following year, to be fatted elsewhere. He has a cow or two of no particular breed. There are also a few pigs, a cross between the Berkshire and the Sussex. These animals, with his horses, make all the manure he wants. The horses are not well bred, but short and punchy; useful, though small. This is not a grazing country. Fatting beasts must have cake and other food purchased for them at the cost of a labourer's wages per head per week. Any that are made out well on the higher-class farms, such as the Duke of Wellington's, generally go to Aldershot, the butchers buying them at home. The ploughing is deep, and the lands a half-rod wide. The team is heavy—seldom less than four horses; but then it must be remembered that the farmer makes a profit of his team. He breeds his horses, takes them up at two years old, uses them for a couple of years, and then sends them to the London market, if at all promising: so that he has always a young and unseasoned team, with here and there an old horse that was not thought good enough to sell. If you see, therefore, four horses at plough, you will probably find, on inquiry, that the third in the line is a colt just put to school, and that there is only one aged horse among them. The farmer aims at taking one colt into his team each year. As a rule, the horses draw in a line, while in the southern or middle districts they work in couples. There are ·07 horses per acre. The plough used is the old Berkshire, with a high carriage and two wheels, when the land is hard and close; a swing-plough, when the land works more freely.

The buildings are of the type generally found in Hants, though, from the greater dampness, rather worse here than elsewhere. There is a yard, dished in the middle, where the stock tread the straw into dung, enclosed by a boarded barn, raised on a few courses of brick, with a thatched roof; by the stables, perhaps a little more substantial; and by sheds, boarded at the back: all, after the first few years, wearing an air of desolation and decay, continually calling for repair, and never seemingly repaired; the wooden walls incongruously patched, the roof with a thick coating of vegetation on it.

Reading on the one side, and Basingstoke on the other, are the chief markets, the railway communication between them running through the most productive part of this district.

The labourer is not so well paid as farther south. The higher the poor-rates, the lower the wages, is, under a law of parochial settlement, the rule everywhere. The ordinary man has 9*s.* a-week; the carter 10*s.* or 11*s.*, without beer except on extraordinary occasions. The latter and the ploughboys are hired by the year. In harvest some farmers give victuals and beer, some double wages. Reckoning a boy and a woman equal to one man, the manual labour per acre is about ·06. Except on the Duke's and some other considerable properties, the labourer is very indifferently lodged. The boys generally live in the farmhouse. The tithe is 6*s.*, 7*s.*, or 8*s.* per acre. The poor and other rates 3*s.* 6*d.* in the pound. The rent of the heavy clays is from 15*s.* to 18*s.* per acre; of the better-working lands, 20*s.* to 25*s.* Leases are not general, nor is there a demand for them.

This whole description applies to "the woodland farmer" only. On some of the more easily-worked soils there are other rotations, if the word can be applied to an irregular mode—it cannot be called a system—of cropping, which varies with the climate, the soil, and the private opinion of the individual cultivator: such are—1, fallow; 2, wheat; 3, beans; 4, wheat; 5, oats or barley; 6, clover. Or again, on lands still lighter—1, roots; 2, barley or oats; 3, clover or peas; 4, wheat; 5, rye, oats, or barley. As the chalk is approached, the farms are larger, the occupier a man of more capital, the fields more open, the buildings, the stock, and everything on a more liberal scale. I might particularise the Duke's mixed chalk-and-clay farm at Wolverton, and others on the road between Sherfield and Basingstoke. But "the woodland farmer" is the man who gives its character to this natural division of the county.

The Duke of Wellington's property at Stratfieldsaye, and in its neighbourhood, is the eminent instance of agricultural improvement in "the Hampshire woodlands." The late Duke laid out the greater portion of the rental in permanent improvements on this extensive estate. He began draining in the year 1820; and I have, this year, seen some of the park-drains, which were then put in, taken up. They are laid with mole-trap pipes, about a foot deep, just a-top of the clay. "They didn't think they'd draw if they put them into that," said the labourer, pointing to the clay, into which he was employed in sinking them 3 feet deeper. On these clays the present draining standard, gained by an experience of forty years, is a depth of 3 feet, and an interval of 20 or 30. Some drains were, a few years since, put in 5 or 6 feet deep, and 60 feet apart. The depth was unnecessary, for all the water is surface water; no springs are tapped till the chalk is reached, 320 feet down; and the distance was so great, that drains (3 feet deep) were required in the intervals. So completely did the Duke carry out this foundation of all agricultural improvement on such soils, that, throughout his property here, but few acres, requiring draining, are now undrained. His agreement with the tenants generally was, that they should haul the pipes, and pay five per cent. on their cost price at the kiln, and on the expense of putting them in. The chief difficulty experienced has been from roots of trees, and even of thistles. Main carriers, 10 or 13 inches' diameter, have been found choked with them.

The Duke's next improvement was chalking: 15 tons on the sand and gravel soil, and 25 on the clays, are considered a good chalking, the effect of which is the same here as elsewhere, both in the north and south. A particular instance of its mineral action is the destruction of the wild-chamomile on the sand and gravel soils, by correcting the acidity which nourishes that weed. Before the construction of the Basingstoke and Reading Railway, chalk was carted from Basingstoke at a cost of from 9*d.* to 1*s.* per ton per mile in this heavy country; now it is delivered at Bramley Cross at 1*s.* 6*d.* per ton.

Farm-buildings were the next consideration. These were once, as too many others in Hampshire still are, wretched hovels of boards and thatch. They are now brick, boards, and slate. The convenience of the farmer and the labourer has been equally cared for. New farm-houses and labourers' cottages, with suitable accommodation, and with a quarter of an acre of garden attached, have been built. School-houses in the different villages have been erected.

The results of these changes are seen in the improved system of agriculture on his Grace's own farms, and on the fields of those tenants who have been inspired by his example. Roots are grown; seeds are sown with spring corn; the four-field rotation, not possible formerly, is being adopted; the drill, sowing 6 or even 4 pecks of seed, instead of 8 broadcasted, and the horse-hoe, are at work on land which previously would not bear the treading of horses; some of the roots are hauled to the yard for the grazing-beasts; more manure is made at home; guano and superphosphate purchased; indeed some landlords are allowing their tenants to sell hay, on condition of bringing back the value in artificial manures. The produce is increased to 32 bushels of wheat and 35 of beans, or 25 per cent. The Duke's cattle, on his home-farm, are of Stratton's blood. There are three flocks: one of Hampshire downs; another of a breed from the Forest of Ardennes, small and active; a third of Exmoor sheep, which rough it here as on their native hills, and do well. But this is not a sheep country, and these flocks could not be kept without the help of the park. About 25 head of cattle are reared yearly, and other beasts purchased in the spring to turn out in the park. About twenty of the oxen bred on the farm are grazed, and sold in February yearly at three years old. The roots are pulped, mixed with chaff, cake, and meal. The store cattle are kept in the park in the summer, and in yards during winter.

The home-farm buildings, erected some years since, are sufficiently commodious, and, like everything else here, practical rather than experimental. There are three yards for stock of different ages, and stalls for tying up grazing-beasts and dairy-cows, with a feeding-passage at their heads. There is not a useless article or animal on the premises. But the most noticeable feature is the artesian well, the formation of which revealed some geological secrets. For the first 100 feet no water was found; then there was an oozing through a layer of sand, but this water was impregnated with magnesia. The sole other formation penetrated was dark-coloured clay, till, at a depth of 320 feet, the chalk was reached, and the springs tapped, when the water at once rose to within 25 feet of the surface. The supply never fails under whatever consumption, and, of course, it never freezes. On a frosty day it will feel, and will show itself to be, warm, throwing off steam on exposure.

Among the Duke's many excellent tenants it will not be considered invidious to select Mr. Boxall of Stratfieldsaye, as one of the most intelligent and improving. His occupation consists of 308 acres, of which 264 are arable, 37 pasture, 7 coppice.

Mr. Boxall has attentively studied the subject of rotations most suitable to strong lands, and as the result of his reading, personal observations, and experience here and elsewhere, particularly in Sussex, he, on entering on his present farm seven years since, adopted an eight-years' course, as best calculated, in this soil and climate, to attain the great object of all rotations—permanent fertility, increase of the soil's produce and ability to carry stock.

Mr. Boxall's course is: 1, (roots swedes, mangold, turnips, a few white carrots, and cabbages); 2, oats or barley; 3, clover; 4, wheat; 5, green crops (half tares, half trefoil and white clover, according to his wants); 6, wheat; 7, beans: 8, wheat.

Thus, every year, he has three-eighths of his land in wheat, one-eighth in oats or barley, one-eighth in beans, one-eighth in clover, one-sixteenth in tares, one-sixteenth in trefoil and white clover, one-eighth in roots. In other words, five-eighths of the farm are under crops cultivated for their seeds, while the remaining three-eighths are allotted to plants cultivated for their roots and leaves.

In this rotation, besides its general accordance with approved rules of farming (such as "clover once only in eight years," and "no two white-straw crops in succession"), and its obvious advantages over the system usual in this country, it may be remarked that the crops for the sheepfold come at an equal distance of four years apart—in the first and fifth years. Further experience of his wants in this respect, may induce Mr. Boxall to grow less or no trefoil and white clover in the fifth year, but all tares; in which case the sheep would be folded on all the green crop, as well as on all the root land. With the view of guarding against accidents in his wheat crop Mr. Boxall has taken the precaution of "dividing his eggs among different baskets," one-third of the wheat being after clover, one-third after tares and trefoil, one-third after beans. Roots are succeeded by oats rather than by wheat, because the root ground may be poached by the carting of a portion of the produce to the yards, and by the sheep consuming in wet weather the portion left; in which cases a good seed-bed cannot be got for the next crop, except by ploughing up and exposing the land to the winter's frosts, or by ploughing, rolling and harrowing in the spring,—neither of which operations would be possible if wheat were taken after the roots. Again, if wet weather should interfere with the proper cleaning of all the land preparatory to the root-crop in the first year, there is a chance of this being effected in the fifth year, by breaking up the tare and trefoil ground as soon as the crops are off, and making what is called a "bastard fallow" for wheat.

The enumeration in the rotation includes the main crops only. There are also certain intercalary or stolen crops, such as Italian ryegrass and trifolium—four or five acres of each to carry on the stock of the farm, after the roots are finished; the Italian ryegrass being sown at the last hoeing of the wheat in the spring, the trifolium immediately after harvest, both being consumed in time for the turnips to succeed. Another stolen crop is turnips or rape, after the winter tares are fed off by the sheep, or after the trefoil in the fifth year. As an instance of what may sometimes be done in this way, it may be mentioned that, in 1857, Mr. Boxall, after feeding off a crop of spring tares (sown in February), immediately broke up the land and drilled turnips.

He exhibited at the Reading Farmers' Club some of the roots, measuring 18 and 19 inches in girth, stating, as a notable fact, that the seed and the produce from it were both grown in the same year.

Mr. Boxall rightly thinks that subsoiling should follow draining, in order to break up the old pan, pounded by the horses' feet time out of mind, and so let the surface-water down to the pipes. He has accordingly, during the seven years of his occupation, subsoiled to the depth of 14 or 15 inches seven-eighths of his land, preparatory to the root-crop. He is so satisfied with the result, that he intends going a little deeper as the land comes round for roots again.

His manuring for mangold or cabbages (which can hardly be overdone) is 12 two-horse cartloads of farmyard dung, ploughed in; 1½ cwt. of Peruvian guano, mixed with 4 cwt. of salt, broadcasted just before sowing; 2 cwt. of superphosphate, with 20 bushels of burnt ashes (wood ashes, if possible; above all, beechwood ashes, which have been proved to be the strongest of all) drilled in: for swedes or turnips the same dressing, omitting the guano and the salt. Mangold are getting into favour with Mr. Boxall for these reasons: 1, they are a more certain crop to get than swedes; 2, with equal manuring, they produce 10 tons more per acre; 3, after Lady-day, they are more fattening both to sheep and cattle. If eaten alone, mangold, grown on this strong ground, cause a looseness in the bowels of all stock: fatting sheep, though supplied with good hay-chaff and beans, have been thus affected; and mangold are not therefore given by themselves, but together with swedes in the early spring, or with Italian ryegrass and trifolium in May.

I saw Mr. Boxall's mangold crop on the ground at its maturity, and although he said that, from bad seed, the plant was too thin, and the crop not an average, yet it was not much, if anything, under 30 tons per acre. He once grew 43 here. Half the mangold are hauled to the yard, half pitted on the spot in a trench made by the plough, which also helps to cover them with the mould obtained by furrows on each side.* A very little protection is sufficient against frosts, and the less the covering the quicker the vegetation in the spring.

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* Eight rows are buried together, the leaves having been first cut off with fagging-hooks as they stand; the two middle rows are then dug up with a dung-fork and tossed aside; where these rows stood, a double furrow is thrown out by the plough; the mangold are then dug up with a dung-fork and tossed into this trench; four deep furrows are then ploughed back on each side towards the mangold in the trench; of these, the two outermost are thrown with a shovel over the mangold, which, however, will have been nearly covered by the first furrow, unless the crop is over 40 tons per acre. For the manual labour in doing this, 10s. per acre is paid.

It is better to twist off the leaves than to cut them with steel.—P. H. F.

Mr. Boxall consumes his roots in this order—white globes, Aberdeen yellows, swedes, and mangold. The two former have been brought to their present perfection by careful attention in the selection of roots for seed, bestowed during 30 years by his father and himself. Mr. Boxall narrates a curious circumstance which occurred in the improvement of one of these kinds of turnips, in illustration of the old adage, that "the proof of the pudding is in the eating." Some seed from roots selected for their round shoulders and general symmetry above ground, and for tapering down to a good depth under, (the two properties go together), were sown side by side with the ordinary seed. The sheep, on being folded over the whole, ate to the ground the produce of the improved seed, and only slightly touched that of the unimproved, thus showing that the principle of selection is as applicable to the growth of vegetables, as to the breeding of animals, and that the choice of seed from handsome roots was not a mere fancy on the part of the producer, but that there was a real difference in the quality of the produce appreciable by those who ought to know best.

In the second year, the oats or barley (very little of the latter is grown) are put in with one plough—3½ bushels of seed per acre. Red clover (16 lbs. per acre), mixed with trefoil (6 lbs.), are sown at the same time. The sheep are run over the clover in autumn, as treading is supposed to be beneficial; and no instance has occurred of losing the plant by frost. In the third year, the layer is cut for hay twice; or a part of the second growth may be folded if wanted. Twelve cartloads of farmyard dung per acre, a *shallow* ploughing in September, if possible followed by the presser, are the preparation for wheat in the fourth year: the seed is 2 bushels; rough-chaff is preferred for its short stiff straw. In the fifth year, the tares (half-winter, half-spring) are fed off with sheep; the mixed trefoil and white clover is mown for hay. In the sixth year, the wheat land has the same dressing as before, except the portion where the sheep have been folded. In the seventh, the beans (spring) have 12 loads of dung. In the eighth year, the wheat requires no help, if the beans have been generously treated.

Mr. Boxall's predecessor used to require 16 horses; but draining, and the frequent use of the cultivator instead of the plough, enables Mr. Boxall to do his work with 12 good seasoned animals, or about 4½ horses per 100 acres of his arable land—a remarkable contrast with the 7 generally used in this country. Of bullocks he fats none, but winters, beside his stock of 8 cows and a few young heifers, about 20 steers, which, being bought in the autumn, are served with straw and roots up to January, after which they get for two months a little cake and hay in addition, and are then sold out "proofey." The same plan is pursued with sheep. The present stock is, 100 ewes in lamb, 100 two-tooth wethers, 65 barren ewes, 125 lambs, all of which will go off to the butcher within the year. Ten or twelve farrowing sows are kept, and all their litters fatted, either for pork or bacon.

Situated on the edge of the "Hampshire Basin" stands the Vyne, a spot of great historical interest. Mr. Chute's Vyne farm consists of 500 acres of some of the heaviest and most expensive land to work in this neighbourhood; 300 are arable, 200 pasture. The whole used to be dotted over with fine timber, chiefly oaks, of which some noble specimens yet remain near the house, while broad bands of coppice ran between the fields, and oak and hazel formed the hedgerows.

Mr. Chute began his improvements by thinning and singling out the trees, which was good neither for them nor for the land: not for them, because the old trees would not stand an exposure to which they were unaccustomed; not for the land, because the timber still left, shaded and exhausted the soil to the impoverishment of the crops. He "reformed that indifferently" [*i. e.* pretty well], as he thought, by his thinning. He went on to "reform it altogether," by making a clearance of all the timber and coppice, grubbing 40 or 50 acres of hedgerows, squaring and dividing the fields by some miles of whitethorn hedges. This is avowedly his preparation for the steam-plough, to the use of which he looks forward with hope. "If it will pay anywhere," he says, "it will pay here. Autumn tillage is not possible without it. You want a power which will cultivate, without treading." Mr. Chute was, from theory, an advocate of deep draining, but is, from practical experience in this country, a shallow drainer; 2½ feet deep, 5½ yards apart, and across the declivity, are his matured rules. He has effected a perfect cure. The water never stands on his ground, and the hunting men say it is a pleasure to ride over it. Mr. Chute has a tilery of his own, and does all the draining on his estate for his tenants, charging them five per cent. on the outlay.

But even Mr. Chute cannot dispense with an open summer fallow every seven or eight years, any more than his neighbours. He has in vain tried to do so, and is the creature of circumstances, only in a less degree than they. His superiority rather consists in having wheat more continuously, in better crops, and in less costly cultivation. He has wheat and beans alternately for three or four years each, while they are obliged, more frequently than he is, to substitute oats for wheat. Still, after all his improvements, he does not pretend to a definite rotation. Every crop is manured with rotten dung. The horses being very superior, two are generally sufficient to a plough; three are enough at any time; four to a drag; six to Crosskill's roller. Drilling is general; 12 rows on a half-rod land, with "Aldershot manure," which is also used as a top-dressing where required.

About 20 acres are in roots, and the same quantity in clover and winter tares. Mangold have been grown with farmyard dung and superphosphate, several years in succession on the same ground, without any diminution of the produce, which has been from 35 to 40 tons per acre. The swedes are fed off in April and May, and the land is then sown with white turnips or rape, which are again fed off in September and October, when the land comes to wheat without any more manuring. White turnips being a very precarious crop, Mr. Chute has lately tried mangold instead, and found them succeed, folding on them (contrary to his previous practice) as on turnips. He is thus able to grow wheat after mangold, whereas if mangold are hauled away, oats and not wheat must follow.

Four horses are sufficient for each 100 acres. Beasts are not grazed, but 20 cow-calves are brought in as suckers, and go to Reading fair in-calf at three years old. In winter they have wheat, oat, or barley straw, perhaps pea haulm, with a little hay. In summer they are turned out to grass. About 200 couples are bought in March or sometimes later, and the ewes and lambs fatted off with corn and cake; the lambs as soon as may be, the ewes following from time to time up to Christmas. Besides 17 or 18 breeding sows, there are in the yards 175 pigs in all stages, which are sold as stores when worth about 30*s.* a-piece. The Berkshires are preferred, the Essex being too tender.

Mr. Chute has built new farmhouses and cottages over the whole of his property. He keeps the cottages in his own hands, though he may consult the tenant of the farm as to the occupiers of the cottages on it. On principle he does not provide more than two bedrooms. If there be three, the girl Sarah does *not* go out into service, though she is always on the point of going; or the young man John marries and stays on, with the young wife and baby in the old people's house, instead of getting one for himself.

SOUTHERN DISTRICT.

In describing the "character of the farming" here I would make four subdivisions: 1. The low heavy land in the east, between the main chalk formation and the outlier of Portsdown; 2. The broad band of the Bracklesham country, stretching from Portsmouth westward to Romsey; 3. The New Forest block; 4. The valleys of the Avon and Stour.

1. The No. 1 soil is chiefly developed in the first-mentioned

subdivision. The size of farms here is small, from 50 to 100 and 150 acres; the fields are irregular, and the hedgerows high, with trees standing in them. There is, besides, much coppice: in fact, one-fourth of the whole is underwood; of the remainder four-fifths are arable and one-fifth pasture. The farmers complain of the game. This portion of the southern district is, in many respects, a repetition of the northern woodlands, though the land is naturally less stubborn. The four-course is professed, but practice does not follow profession. No system of rotation is really adhered to; the cultivator does the best he can, according to the season. This is not so generally a bean country as the north is, and turnips and swedes are more attainable here than there. If circumstances be favourable, and if the land be chalked, the usual four-field system will be followed, oats being substituted for barley, and beans for turnips on the stronger soil. The manuring will be for the wheat or for the beans, with some artificials perhaps for the turnips. Chalking is done at the rate of 25 or 30 tons an acre, and is not again required in a generation. The produce per acre is: wheat 20 bushels, barley 24, oats 32.

The live stock are a few cows to each farm, half-breeds between the Alderney and the "Forester," to make a little butter, though there is nothing like a regular dairy. The turnips feed a few Hampshire downs, all bought in. Some buy ewes, lamb them down, and sell off the couples; or, under very favourable circumstances, fat the lambs and the mothers. Some buy tegs, winter them, and get rid of them in summer, according to the state of their keep and their pocket. The pigs are either the usual cross between the Sussex and Berkshire, or the Sussex, mostly stores, though very many are fatted and killed for bacon about Fareham, to supply the large demand at Portsmouth.

Where the land is stiff, stony, and rough, the usual two-wheel plough, with a high carriage, is used; on lighter and kinder soils, the one-wheel. Four horses are required for 8 inches' depth in winter; two or three for 5 inches' in summer. The lands are half-rod, with deep water-furrows. There is not much broad-sharing or drilling, though a drill may be occasionally hired to put in the turnips. Threshing-machines are used for wheat, but the flail for Lent corn. Waggons, not carts, are customary. The buildings are like those in the north, though (the climate being milder) there seems rather less shed-room: not much can be said in their praise. Fareham is the chief market; every alternate Monday there is a very good corn and stock market there. "Buyers, sellers, and lookers-on," says old Fuller, "are the three principles of a fair." The latter chiefly frequent Portsdown, which accordingly has degenerated into a mere pleasure fair. A few horses are brought there, but not much business is done.

Of the agricultural societies in the county, one—the South-East Hants—holds its meetings at Fareham in September, and is designed for the encouragement of agricultural labourers residing in thirty-five of the adjoining parishes; but ploughmen can come from any district. There is a rivalry between Hants and Sussex ploughmen, and the former, though they do "live in the shires," show they are not afraid, by inviting the competition of their eastern neighbours. The prizes are for ploughmen, shepherds, rickmakers, and thatchers; for cottage gardens and for vegetables grown by agricultural labourers.

The wages of the labourer are 11*s.* or 12*s.* a week, of the carter a shilling more. He is lodged much as elsewhere in the county. The manual labour per acre is ·05.

The tithe varies extremely, from 2*s.* to 10*s.*; the parochial rates are 3*s.* in the pound; 15*s.* per acre is the average rent. There are few leases, and generally it is found that tenants hold on longer under an annual tenancy. A short lease unsettles a man.

There is one distinction between this country and the north. There has been no Duke of Wellington here, however much wanted. Much draining remains yet to be done, and much chalking. Portsdown chalk, some of the very best, soft and friable, is close by, but the neighbours resort to it less than strangers, who carry it across the water, loading and unloading it three times. Improvers everywhere are new men, and here the prospect is not attractive. It is the land of coppice, of game, of small farms, of high enclosures, and of the London clay,—not a locality to be deliberately selected by a stranger. In its present condition it will be left to those who are "native here, and to the manner born."

I must again give the caution that I speak not of the farming south of Portsdown, where, in the narrow tract previously described, a more liberal course is followed, as it ought to be, with a kindly soil and a genial climate.

2. The broad band of the *Bracklesham country*, stretching from Portsmouth westward to Romsey, is bounded by the Southampton Water on the south-west, and by the chalk and its clay-bordering on the north-east. This is, with a few unprofitable exceptions, not bad working land. Woods and wastes cover probably a tithe of it, but they are not such woods as have been previously described. The timber-trees do not stand in the hedgerows, spreading their roots and throwing their shade far across the field, appropriating the powers of the cultivated soil,

and robbing the cultivator of the fruits of his labour. They are mostly plantations of fir and larch, and, as such, are crops, just as much as corn or roots. The wastes are those higher portions of the country which are covered with erratic sand and gravel, and if they do no good, at least they do no harm.

The average size of farms is from 200 to 250 acres, increasing in size as you go westward and approach Romsey and the chalk. Three-fourths of the land is arable, and one-fourth pasture.

About Redbridge are some extensive salt marshes, flooded at every spring-tide. They are mown in the summer, the farmer seizing the interval between two spring-tides. Cows and horses (chiefly colts) are turned out at other times. They would be very valuable if the salt water could be kept back, and projects of embankment have been at different times entertained by the proprietors, but the great expense required has hitherto been an insuperable obstacle.

On the arable the rotation is again four-field. Spring beans and peas are sometimes sown together, and called "pulse;" but this crop fouls the ground. The wheat is sown on one earth, the presser following the plough on the clover-leys. The ploughing is very seldom done with four horses: three are generally used, either in line or unicorn fashion, with one on the land side; and sometimes only two. There is not the same nervous apprehension of treading the surface as in the north, where the feeling seems to be, "never mind how hard you pound the pan with sixteen iron feet in the furrow, but, whatever you do, turn up a light seed-bed." The drill is generally used for the spring-corn, but the wheat is often sown broadcast. Where the land is clean and free from *annual* weeds, hoeing is omitted for corn-crops, but roots are horse and hand hoed twice or thrice. Swedes, both here, and generally, throughout the county, are not pulled and pitted even on the best farms. The farmyard manure is applied to the clover-leys, and artificials to roots. The dressing of chalk is from 20 to 30 tons per acre, and requires renewal once in twenty years. Its total cost in the field is about 5*s.* per ton. About Romsey they apply 36 tons. It is submitted that on those peaty lands this is in excess, though there may be something defective in the nature of the chalk at Brook, which supplies this neighbourhood. It may be questioned, too, whether the better method of applying chalk on an absorbent soil is not in small doses at correspondingly shorter intervals. The other principal chalkpits are Oslebury, Henstead, and Compton, the Henstead chalk being preferred, as soft, soapy, and coming soon to hand.

Permission is very generally given by the landlords to sell hay and straw at the great towns, as at Southampton and Portsmouth, on the condition of bringing back artificial manures or stable-dung of equal value. One waggon-load of dung (weighing 3 tons and costing 12*s.*, besides carriage, with 4 horses, a man and a boy), is held to be equivalent to a ton of straw, which sells for 1*l.* This permission does not extend to the two last years of a lease.

The produce per acre is: wheat 25 bushels; barley 30; oats 44; beans and peas (not much grown) 20; turnips and swedes 16 tons; mangold 20 tons; clover and rye-grass 1½ tons. The live stock are a few cows for butter and the wants of the house, either "Foresters" or "Channel Islands," or a cross between the two. The fine river-side meadows south of Bishopstoke facilitate the keeping of good short-horn dairy cows, for whose produce there is a ready demand at Southampton; the milkman, if the farm be within reasonable distance, coming out twice a day, and carrying off the milk without any trouble to the farmer. Where beasts are grazed, they are short-horns. Of cattle, ·07 are kept per acre; of horses (the usual nondescript breed), ·04; of pigs (Sussex and Berks mixed), ·15; of sheep, 1. The sheep are, a few horned ewes for early lambs; Hampshire ewes, put to a Sussex ram; Hampshire downs, or, among the fancy men, the pure Sussex. Some buy in and sell out; some breed their own stock. The implements are either the usual county 2-wheel plough, Tasker's of Andover, or Howard's, which two last are gradually superseding the native machine. Broadshares are not much used.

The buildings are better than in the north.

Though Hants is not a cheese-making county, it has a cheese market at Bishopstoke Station, held on the third Thursday in each month. The original intention was to have a Cattle market also, it being thought that the west country would supply beef, and the neighbourhood mutton. As, however, the western counties (Dorset and Somerset) did not send their beef, a portion of the first design failed, yet they do, especially Somerset, send their cheese. On the great markets, in September and October, as much as 300 tons are pitched; during the summer months not above half the quantity; but, taking one month with another, from 200 to 225 tons are sold at each market. Romsey, Southampton, and Botley are the chief general markets. At Romsey there is an association for the encouragement of labourers, well known from its connection with Lord Palmerston, who presides at its annual meetings, and distributes the prizes. There is also at Romsey a Christmas fat show, with eight prizes for fat cattle, four for fat sheep, four for fat pigs, and the usual prizes for store-animals; 37 prizes in all.

The agriculture of this whole district is under great obligations to the Botley and South Hants Farmers' Club, to their show, and to their eminently practical discussions. If there be a greater spirit of enterprise and more intelligence among the farmers here than among their brethren in the north, this is in a great measure to be ascribed to the skill and intelligence manifested in the conduct of this society by its secretary (Mr. Spooner, of Eling), and its principal members. If an example be wanted of the beneficial results produced by such institutions, let an account be taken of the different improvements made in the agriculture of this district during the last 15 years, and then let the society's publications be perused. It will be seen how every step of that progress has been preceded, and the public mind informed, by full and candid discussions between those actually engaged in agricultural operations. Farmers have thus been led just as fast as they could follow. A library is attached to the club; and a root show is held in December, with small prizes for fine individual specimens of the different kinds, and larger to those who exhibit whole fields. At Botley, too, a fat cattle and sheep show (though this attaches rather to the market than to the club) is held. Its peculiarity is, that being held as early as about Lady-day, it gives prizes for *young* fat stock: for fat lambs (of different breeds), 5 prizes; for fat ewes that have yeaned and fatted lambs the same season, since 1st December, 4 prizes; for fat wether tegs, 4 prizes; for the best fat steers and heifers, severally 2¼ or under 4 years old, 5 prizes. "Early maturity" is the motto of the show for stock, and in a question of agricultural profits early maturity means "quick returns."

The ordinary labourer has from 10*s.* to 12*s.* per week; carter and shepherd, from 12*s.* to 14*s.* The manual labour per acre is ·07: the tithe is 5*s.* per acre; parochial rates, 3*s.* in the pound; rent, 1*l.* 4*s.* per acre. Leases are pretty general, for terms of 8, 16, or 24 years.

In no part of the county has agriculture of late years made more sound advances than in this district. You do not, indeed, see establishments on the same enlarged scale as on the chalk, for which the same opportunities do not here exist; but you find arrangements adapted to circumstances of soil, climate, and demand, with much originality, and not mere copying from other, and probably dissimilar localities. The credit is due to the intelligence and spirit of the tenant-farmers themselves, of whom the occupiers in the large and influential parish of Titchfield are examples, and of them Messrs. Hewitt and Mr. Horace B. Leggat, of Brownwitch, are good representatives. About Bishopstoke railway station also may be seen some excellent specimens of South Hants farming, on the lands of Messrs. Atkins, Mr. Scott of Great Eastley, Mr. David May of Stoneham, and Mr. Thomas Gearing of Swathling.

On some of the best-managed arable land, such as Mr. Scott's, a sort of double three-field system is pursued—two rounds of three years each, or a six years' rotation, thus : 1, wheat; 2, mangold, swedes, or turnips ; 3, barley or oats; 4, seeds ; 5, wheat; 6, pulse (beans and peas). Deviations occur, according to the season, the condition of the land, and the wants of the live stock. If the wheat stubbles be foul in the second round, turnips will be substituted for pulse; and in this case the turnips are folded off, and no dung is required for the first round. The wheat or pulse must be well dunged in the second round. Bridgewater ewes are bought in at Appleshaw fair, the lambs are ready by Christmas, and their mothers are also gone to the butcher by the latter end of May, having been previously shorn. Or, if food be plentiful, a few down lambs are bought at Stockbridge fair, and sold out as fat tegs. Nothing is bred, nor anything, as a rule, fatted, but sheep.

A little further to the east, near Botley, there is, on a soil less favourable, equally spirited farming. The lands of the Messrs. Warner, and particularly Mr. William Warner's, exhibit in the well-filled stack-yard the results produced by a large head of stock fatted annually on cake and corn. Mr. Gale (the County Court Judge) has greatly improved his recently-purchased property at Kitnocks by extensive draining and high farming. Mr. Gater (the President of the Botley Club) has done the same at Town Hill, by the same means.

Among the many examples of improving agriculturists in this district I shall select, for more detailed description, an eminently practical man, whose example may be safely followed, Mr. Joseph Blundell, of Bursledon. He derives no peculiar advantages from soil or climate, although the undulations of his ground, and its slope to the south, may be somewhat in his favour. But, on the whole, if the landlord has done his part, and there are liberal covenants in the lease, and intelligence and capital in the occupier, what Mr. Blundell has done is within the reach of three-fourths of the farmers in the neighbourhood. And yet a short description of his farm will show he has done much.

The extent of Mr. Blundell's occupation at the mouth of the Hamble, on the right bank, is 100 acres arable and 25 pasture. The whole is on the Bracklesham beds which rise above the alluvium of the estuary of the Hamble, the soil being a sandy loam, with a stiff putty-like subsoil : tiles are made close by. The surface is very undulating, the ground falling every way, but the whole open to the south and south-east, and well sheltered to the north. This variety of slope carries the surface water off rapidly, but the subsoil would render the land hopelessly wet in a bad season, but for a network of drains underneath. The climate, the aspect, and the nearness to the sea, are nature's favours, of which Mr. Blundell makes the most. He commenced operations by carrying away 23 gates, and throwing down all his hedges, which originally divided, into 10 fields, lands, now separated by the road only. The saving in trimming hedges, scouring ditches, turning in and out of gateways, to say nothing of other advantages, must be very great.

He has no regular system of rotations, but his crops of wheat follow in very close succession, and are taken anyhow and anywhere, if he thinks the land capable of producing them. The result for twenty-nine years is, that he has never failed in securing a good crop in anything like a favourable season; which shows that more depends on season than on cultivation or rotation. He has, however, this general scheme: two-fifths of the whole farm wheat, one-fifth potatoes, one-fifth oats, one-fifth grass and roots. The wheat and potatoes, 60 acres out of 100, are dressed with 30 loads per acre of unfermented box dung (of which more presently) ploughed in green. The lands are very wide (3 rods), furrows very deep, and ploughing to the depth of 8 inches, with two horses abreast; the plastic clay would be turned up, if the plough went deeper. The wheat is sown broadcast. There has been some reason to fear that the use of the drill would destroy the race of "seedsmen." The last good man, at all events, survives on Mr. Blundell's farm, for nothing can be more even than his young plant. Thin seeding is not here adopted, because it necessitates early sowing, which interferes with autumn cultivation, a point of more importance than saving a few bushels of seed. His plan of autumn cultivation is to fork out any chance lumps of couch and then use the scarifier (Coleman's) if necessary; this keeps the land so clean that no hoeing whatever is necessary for the wheat crop. For the root crop one hoeing, with after picking out and heaping the weeds, is sufficient. The expense of this is not equal to two hoeings, and is a more eradicating process than any number of flat hoeings. A portion of the mangold ground was four times hoed last year, and still was very foul in comparison with the remainder, which had been hoed once and picked. The latter was a most successful piece of cleaning in a wet season; the former was like other people's ground elsewhere. The whole farm is very clean, and yet it is just the sort of soil in which couch would spread if not well kept down. The potato-ground is ploughed deep soon after harvest, and allowed to lie during winter; in the spring it is scarified, then dunged, ploughed, and planted. No other land is ploughed twice. At the time of earthing the potatoes by the double mould-plough, turnip seed is sown, and thus "heled;" the turnips arrive at maturity before the potatoes, and are pulled without damage to them. This season the potatoes were worth from 18*l.* to 23*l.* an acre; and the turnips gave 20 tons of roots and 8 tons of tops, which last were consumed, with some rough hay and a little cake, by the fatting bullocks. For years Mr. Blundell has annually sold 300*l.* worth of potatoes off the farm; and one year he grew, besides, 460 sacks of wheat. Here potatoes are the best possible preparation for wheat; a good trap, too, for the wire worm, which gets into the skins, is measured off with the potatoes, and troubles the farmer no more. Since 1845, Mr. Blundell has, on one piece of land of 12 acres, taken wheat and potatoes in alternate years, with one exception, when he took clover between two wheat crops. He generally also took a crop of stubble turnips after the wheat and before the potatoes, feeding them off with sheep, which thus in part manured his potatoes. On the whole the potatoes have been more profitable than the wheat, and yet the wheat has run up to 52 bushels per acre and 63 lbs. per bushel. The stubble turnips are generally put in after wheat or oats thus:—before the corn is carried, the plough is at work between the sheaves, and thus two-thirds of the ground are first sown; afterwards, the rest. The value of time is sufficiently shown by the fact that the roots of the portion first sown often weigh twice as much as those sown, perhaps not more than a fortnight later. Swedes Mr. Blundell cannot now grow; his cultivation is too high, and his ground sick of them. He also prefers, for all purposes, mangold. Some good carrots, for which his soil is well adapted, are grown. All roots are pulled and pitted on the ground. The white Canada oat is much in favour here, the land in its present state not being suitable for barley. Of these oats more quarters can be grown than sacks of wheat; they are also ready to cut a fortnight before the wheat—a most important two weeks for the stubble turnips. The straw also is essential (as we shall see) to the mode of feeding. Mr. Blundell has often taken two crops of oats, with stubble turnips between; and one crop has been 17 sacks, and the other 19 sacks an acre, and 45 lbs. a bushel. The clover seeds are sown on the wheat ground with a single tine of the light harrows, and then rolled. In nine years out of ten, the clover is sufficiently strong to be mown for cattle, in the same season as that in which it is sown—in the months of October and November. This year, from want of warmth and slowness of vegetation, this feat was not possible. The clover leys are cut twice or thrice. Very little is made into hay, only just enough for the ewes and lambs; the rest is carried green to the fatting and store beasts. Trifolium is also a favourite; it comes early, and is followed by carrots in the same season. During August the carrots are thinned by hand-pulling, instead of hoeing, and thus furnish 12 tons of food per acre. The main crop, when lifted, weighs from 18 to 20 tons.

Mr. Blundell's farm-buildings are well worthy of attention, though he has constructed nothing new. Finding here the usual old barn, with wooden walls and thatched roof, and sheds of the same construction, such as would be called in their original state anything but good, he did better than throw them down and rebuild: he adapted, at a very trifling expense, old premises to new circumstances. There is now no farmyard in the ordinary acceptation of the term, no cattle wandering about, no rough cows, no poor pigs. He considers a farmyard a bad place either for a manure store or for the random intercourse of cattle. The rain washes the ammonia away, sun dries it up, wind blows it off; under any atmospheric circumstances it is lost. The cattle in summer are teased by flies, in winter they stand and shiver. To put 20 or 30 tons of straw into a yard, to turn a few cows and pigs over it, and then as soon as it is wet to cart it out, is held to be a wasteful system, however common. How, then, are the cattle housed and the dung made? All the corn is threshed and dressed by the rick-side with steam power, so the barn is not wanted: this, therefore, is converted into a feeding-house: the rats are turned out and the cattle in; the mows are excavated 2 feet, divided by moveable rails, the food is prepared on the floor, on which also the carts are backed, when the dung is hauled out straight from the pits to the field. Mr. Blundell considers no feeding-houses that could be constructed for cattle equal to a barn, where there is good height and ventilation. The bullocks are not tied up; they are littered deep with straw, and from their birth to their death there they stay. Whether growing or grazing, nothing can look better. I saw two fat heifers there, one 17, the other 24 months old, weighing respectively 30 and 40 score, and paying for their keep 3*s*. 3*d*. per week throughout their lives. In the preparation of cattle-food there is as little trouble and expense as possible—no steaming, no cooking for any animals: the roots are simply sliced for the bullocks and pulped for the pigs. The horse-stables deserve also to be mentioned: they are free from all smell whatever. Under the horses are pits, filled up to the level of the floor with earth, which is trodden as hard as a stone, and upon this the usual litter. All urine is absorbed, for liquid will penetrate porous earth, however hard. The horses thrive excellently: their lives are said to be prolonged for three years; and unquestionably foul air is a fruitful source of disease and of debility. This plan has been pursued here for twelve years. Wherever animals are, there manure is accumulating; wherever manure is, there is earth under it for soakage. In the houses eighty cartloads of this impregnated earth are made yearly, irrespective of the straw-dung made on the earth, and each cartload of earth is considered worth two of dung. The earth is taken out about twice a-year.

The management of sheep is entirely different: they are never housed. Bridgewater horned ewes are bought in the fall and lambed down in the open. Fat lambs are often sold by Easter, 15 or 20 lbs. a-quarter, and their mothers then, or as soon after as possible, weighing 15 stone of 8 lbs. At the end of January I saw lambs of 40 lbs. weight. The ewes lamb early in this favourable climate, and the weather is not feared. The shepherd says, "Where the mud sticks the fat sticks;" and certainly the mud sometimes does stick to the fleece, which flaps like dip-candles when wet, and rattles like wax-candles when dry. The best sucked ewes have sometimes realised 75*s*. a-piece, and the lambs 44*s*. The mode of feeding is: for ewes during the first six weeks cut carrots, for the remainder of the season cut mangold, with oilcake-meal strewed over it in the troughs; in the two last months they receive an additional ½ lb. of cracked beans per head per day, and throughout, as much prime hay (clover and Italian rye-grass) as they like. The lambs get, during the whole season, carrots (put through the cutter twice, which makes the pieces dice-shaped), American cake-meal strewed over the carrots, grey peas, cracked, as much as they can eat, with best Dutch clover hay. They never see an empty trough from their birth to their death. In summer no sheep are on the farm; all are cleared out by the beginning of May. "Feed stock in winter, raise crops in summer," is Mr. Blundell's motto. Horned cattle he must feed all the year round, and he does it thus, according to the season:—in winter, young stock; mangold three times a-day, in small quantities each time; 12 lbs. per head morning and afternoon, 16 lbs. in the evening; oat-straw always in their racks: this keeps them in an improving condition till the time for grass-cutting in spring and summer. Then follow trifolium, clover, and carrot thinnings; when these supplies are exhausted, the roots are ready again. At the age of about 16 months they receive cake and meal besides, and go to the butcher at 24 months, realising on an average one pound per month on their lives, (the calculation of 3*s*. 3*d*. a-week was profit, inclusive of all expenses): no hay is allowed, no fodder but oat-straw. Mr. Blundell believes it impossible to fat bullocks to a profit with hay. He lambs 60 ewes; has 12 bullocks up to fat, besides dairy cows and young stock, 20 head in all; 20 pigs, 4 cart horses, and a horse for odd jobs. His ordinary staff for manual labour is 7 men, 4 women, 2 boys, or ·1 per acre.*

I have remarked elsewhere that the improving farmers in Hants are for the most part new men, coming from other parts. The tenant of the Lower Toothill farm on the Broadlands estate is a pleasing exception. This farm has been in the hands of the same family for some generations, and the present tenant, Mr. Richard Withers, jun., pursues the same system of good management as his father and grandfather before him. At his own expense, without any lease, he has now nearly completed the chalking of the whole farm. His management is a good example of the old style. He begins well by a deep ploughing; keeps his land clean, though his wheat be broadcasted; gets good crops; has no clubbing in his turnips; buys in half-bred Hants ewes; fats out the lambs and mothers, and generally follows the custom of the country, but with an eye open to any new lights which may be offered to his notice. Such a tenant is properly appreciated by his landlord, who has drained the farm and is now erecting on it a new farmhouse and buildings, which will render it one of the most complete little farms in this part of the county.

Most of Lord Palmerston's farms are well supplied with cottages handy to the labourers' work. His arrangements for letting them differ somewhat from those mentioned elsewhere. The farmer nominates his own servants as the tenants; but their connection, when once in the cottage, is direct with the landlord himself, who receives the rents, and, if necessary, gives the notice of removal. Practically this division of authority works well. The farmer is careful in the selection of his men, and the landlord and the farmer do not differ as to causes of change in the occupation of the cottages.

Still further to the south in this district, and almost bordering on the Forest, is a very pretty farm, with a loamy surface-soil on a gravelly subsoil, at Testwood, kept in hand and well managed by its owner. It was extensively drained, and the well-planned farm-buildings were designed by Mr. J. Chalmers Morton, of Whitfield.

3. In the *New Forest* the oldest plantations, the first-fruits of culture, are those of William III. Authority was then given to plant 6000 acres. The next are Phillipson's, 1756, then Pitt's, 1776. In 1808 a new system arose. A commission of three was appointed, and the Surveyor-General of Woods and Forests became the chief commissioner. Planting then first began on

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* Certain particulars of Mr. Blundell's farming have appeared in the Society's Journal, but I have purposely avoided referring to them in writing this account, which is derived solely from what I saw at Bursledon, and from conversations and communications with Mr. Blundell.

an extensive and regular scale, so as to include from 1808 to 1851, 7200 acres. In the last-named year the Deer-removal Act was passed, by which the Crown acquired the right of planting 10,000 additional acres, in consideration of giving up the right to keep deer; so that now there is authority, under King William III.'s legislation and that of 1851, to enclose and plant on behalf of the Crown 16,000 acres. But, out of this available total, only about 6000 are actually enclosed at the present moment, being in various conditions, from the large and flourishing nursery at Rhinefield, where the oaks are as big as your little finger, to the old abodes of the patriarchal monarchs of the wood elsewhere. About 700 acres are planted annually. No particular acreage is cleared annually. The value of the oak supplied to the navy, for eleven years past, is 70,000*l.* Scotch fir is found to afford the best protection to the young oak in the new plantations. Larch is here not so good a nurse, probably because it does not thrive in the Forest. Deodaras are being tried by way of experiment. The cost of planting is very materially reduced by the use of a new tool, called the planting-spade, which heaves up the soil, so that the tree can be let in, when a tread of the foot completes the operation. No pits are made. The planting is, very properly, not job work: other work, very properly, is, as far as possible.

Experiments have been made as to the pruning of timber-trees, and the results are against any interference with the oak. There are two descriptions of oak in the Forest—the *Quercus pedunculata*, and *Q. sessiflora.* In the first the acorn is supported on a long peduncle or stalk, which is its chief distinguishing feature: this is the staple tree of the country. The other, the fruit of which is sessile or stalkless, and clustered, arrives at maturity earlier, and, as might be expected from its more rapid growth, is less esteemed for ship-building. Beeches are found in many parts, especially about Burley Rails. There are two descriptions of furze—the long and the bed; many ferns; two heaths (the purple and the pink); and one ling (the pink). Rhododendrons grow wild in Minstead, favoured partly by the peaty soil, chiefly by the mild climate.

The Forest used to be notable for breeds of New Forest ponies and pigs: indeed any one would have referred to these two animals as characteristic of the county, and a credit to the Forest. The ponies are no longer ponies, they are ugly galloways, with big heads. They have lost that action and form for which they used to be celebrated, and are still degenerating, in spite of efforts made by the Crown and by private persons. Arabian stallions have been kept by the Crown and by Mr. Alexander Elphinstone, of Chuten Glen; but the foresters did not make use of them. In fact, they cannot improve the breed, under a system of common pasturage, with entire horses running wild. Nor do they care about breed; their plan is to sell the mare, at two or three years old, in-foal; and nobody would give more when the mare was put to a good horse, because no one would believe any assertion on that point, while the present promiscuous system continues. The same causes operate against any improvement in the breed of cattle. Bulls of all descriptions, and of very inferior descriptions generally, are turned out, and a nondescript animal is the necessary result. "Foresters," as the cows are called, have the reputation of hardiness, and of being good milkers: the best of them have been crossed with the Channel Islands breed. A better and more defined animal is not possible under the Forest system. The pigs are red, or black and white, high-backed, long-legged, stiff-necked, and big-headed, with awful ears, which, however long, are deaf to good counsel. There is something to be said for the bad breed of horses and cattle, with the set-off of long-continued common keep; but what excuse is there for the perpetuation of the existence of this unthrifty porcine animal, seeing the pannage season is for one month only? There is not now anything peculiar in the preparation of Hampshire bacon. The practice, throughout the mainland and island, is to scald for pork, and burn for bacon, which is also smoked generally.

There are now no deer in the Forest. Nothing strikes a stranger in the Forest more than the absence of animal life: there is hardly a blackbird even on the wing. The cause, doubtless, is want of food. A few black game are found in the wilder and more unfrequented parts. The Norman high-preserving forest laws are indeed a nullity. There is nothing now left to preserve.

The traditional estimate of the New Forest labouring population is not favourable. "The inhabitants," says a recent popular author, "have little visible means of existence: though they profess themselves to be woodmen, charcoal-burners, &c., it is pretty generally understood that poaching and smuggling are their more probable vocations." Nothing can be more unjust. The labourer in the forest has three harvests, irrespective of ordinary agricultural work. There are tree cutting and rinding, fern-cutting, and turf-cutting; to which has to be added much employment in carriage of timber to the dockyard, in draining, fencing, and planting. The people are well off: their manners and morals have improved with their circumstances. They combine a respectful address with an honest independence of manner. No doubt much of this improvement is owing to the destruction of the deer, and freedom from poaching temptations.

Farming proper on the *Crown* lands of the New Forest is confined to those held by Wm. Dickinson, Esq., at New Park and Burley Rails. The former consists of 270 acres (150 arable and 120 pasture); the latter of 160 acres. The following observations will refer exclusively to the former, for it is there that Mr. Dickinson resides and directs operations which have attracted, and deserve attention. The surface-soil in the northern part of his land rests on a mixture of gravel and clay; that in the southern on gravel, with a substratum of close sand: altogether it is the best land in the Forest. His rotation is the four-course, as closely as it can be followed.

The cattle are principally Scotch bullocks (which are well adapted to the Forest keep), occasionally some Devons and Short-horns, all bought in young, turned out in the Forest during summer, fed in yards during winter till old enough to be grazed, when they are tied up, and sold on the premises by auction. Channel Islands cows are kept for the use of the house: 100 ewes, partly Hampshire and partly Southdowns, are bought in annually, lambed down, and ewes and lambs fatted off. The pigs are of the Yorkshire kind, bought originally of Dr. Hobson, of Leeds. The cart-horses are bred on the farm from mares (a cross between Clydesdale and Yorkshire), by a Normandy horse. The fillies are retained, the horse colts sold.

Mr. Dickinson is rich in implements. Tuxford's 8-horse portable steam-engine pumps water from the Forest into the reservoir, where the water is mixed with urine of the live stock, pumps the liquid manure out of the reservoir over 45 acres, laid down with iron pipes, and usually cropped with Italian rye grass (on the cultivation of which Mr. Dickinson has published a valuable pamphlet), and roots. For the former his proportion of water to urine is two to one, for common grasses four to one, for clover six to one. Mr. Dickinson's experience is in favour of liquid manure for present results, solid for future. He would no more huddle up the two together than mix sovereigns and shillings in a purse. The engine does the other usual work, pumps water to a reservoir for the supply of the yards and sheds, cuts chaff, grinds, threshes, &c. Clayton's combined mower and reaper, Ashby's horse-rakes, Hornsby's corn-drills, Howard's ploughs, Garrett's horse-hoe, Chambers' manure-distributor, and every other scientific implement that can be desired, may be seen on the premises. The store-cattle shed is divided into three compartments, as is also the fatting-cattle shed. Each animal is fed separately through sliding doors from the covered way, which connects the two sheds, and is found extremely useful. One hundred and sixty sheep are fatted on boarded grating. A tramway connects them with the food factory, where everything relating to feeding is kept and prepared.

I have no means, from what I saw, of forming an opinion on Mr. Dickinson's success. He should be regarded as making an interesting agricultural experiment in an unpromising soil (though it be the best in the Forest), and should be allowed time to work it out.

Although the New Forest itself consists, for the most part, either of dreary wastes, producing little but heath or turf, on which the efforts of nature to form a soil have, from time immemorial, been frustrated by the perversity of man in cutting the turf for fuel every third year,—or else of timber and gorse, interspersed with pasturage, which occupies the better land and would be worth cultivation,—there are yet on its borders, or intersecting it in various directions, *private* properties of various sizes, from 5 acres up to 500, all farmed by the help of the Forest. The smaller holdings are very generally occupied by the owners, though not always so, for there are no less than 105 tenants, each having less than 50 acres, on the Minstead Manor alone. These petty Forest farmers are, as is usual with the class, men of no capital and much industry; they work and live harder than common labourers; their subsistence is eked out by rearing a few cows and some Forest colts ("heath croppers"), by personal labour, and by the hire of their small horses to haul timber, faggots, or chalk; their house-fuel comes from the Forest; their contrivances for lodging themselves, their families, their carts, cattle, and horses, may be seen, pitched like gipsies' tents, on the skirts of the Forest,—things of shreds and patches, monuments of economy, marvels of human ingenuity in shift-making.

The larger farms, though in many instances not sufficiently cleared of hedgerow timber and inadequately drained, are also very generally in the hands of the owners, and present examples of fair farming. The best and also one of the earliest examples of agricultural improvement in draining and farm-buildings, on private lands in the Forest, is at Minstead Manor. The usual four-field system is followed, with trifolium sometimes as a catch-crop between wheat and turnips; the clover-leys are heavily dunged for wheat, ploughed in September, and the seed got in before the end of October; the wheat-stubbles receive a great deal of cultivation for turnips; they are first cleaned with Bentall or Coleman, ploughed twice (if possible) before winter, and two or three times in the spring, besides draggings and harrowings. The estimated cost for cultivation and superphosphate is nearly 8*l.* per acre. Some of the roots are fed off with sheep, some hauled home for the Scotch beasts. There are two ploughings for barley, and one for oats, both of which are drilled.

The seeds are broadcasted a fortnight later, a roller or light harrows following. Scotch beasts are favourites, both as being superior in quality and suitable to the Forest, where they run for two years.

The Southampton Water, on its south-western side, is bordered by farms lying between it and the Forest: some have a stiff subsoil and require drainage, as at Eling and Dibden; while others are on a gravelly bottom, as at Marshwood, Fawley, and Beaulieu. The land about Fawley, though liable to burn in a dry time, grows barley of an excellent quality. Some of the best farm-buildings in the county are in this neighbourhood, at Cadland, which was also the scene, half a century since, of agricultural improvement by extensive draining on Elkington's principles.

The soil of the whole of this district is deficient in calcareous ingredients, and will not grow healthy turnips except it be limed or chalked. The latter is the usual remedy. The quantity, applied to the wheat-stubble or to the clover-leys, is usually 20 tons per acre. The cost varies with the locality. Chalk can be brought to the waterside from Portsdown at 2*s*. 6*d*. or 3*s*. per ton; or the railway will convey it from Whiteparish (near Salisbury) to Ringwood for 3*s*., or to Brockenhurst for 3*s*. 6*d*. But whether it come by water or by rail, it has to be reloaded and carted home; and generally, so cheap is horse-labour in the Forest, hauling the whole way is found to be the best policy. The little farmers undertake, at their leisure seasons, to deliver it at a distance of 18 miles from the pit for 5*s*. per ton, or 5*l*. per acre.

After some high ground, covered with erratic gravels and sands (Sandy Brake Common), the soil becomes deeper south of the Forest, as the coast is approached. The system is the four-course, without the variations which a better working soil elsewhere admits. It is nowhere better followed than by Mr. Nichols of Buckland, near Lymington. Chalk is not generally applied south of the Forest, on account of the expense of carriage.

The produce of this district is, wheat 24 bushels; barley 30; oats 35; swedes 20 tons; clover 1½.

A show of fat cattle and sheep was inaugurated at Lymington last winter.

The labour is ·06 per acre, and wages rather lower than those last mentioned. Tithe is 3*s*. the acre. Poor-rates 3*s*. 6*d*. in the pound. Rent 20*s*.

4. In the *Valley of the Avon*, at North Chardford (where the river enters the county), and at Breamore, *i. e.* as far as the chalk reaches, there is a mixed system of vale and down farming,

which is indicated by the larger breeding flocks. The farms run from 400 to 500 acres. The vale rotation above Fordingbridge is four-field, with modifications. A stolen green crop (rye, tares, trifolium) is taken between the wheat and the turnips, and beans with turnips are sometimes substituted for grass. Of the swedes only half are consumed in the fold, or the land would be too strong for barley, and this is a fine barley country. Rape is often drilled, every fifth row, between the swedes. The seed wheat preferred is White Rough-chaff, Morton's Prolific, Spalding's, and Browick (all good wheats to stand), and, for late sowing, Nursery. When beans and turnips are taken together, the turnip-seed is put in when the beans are hoed. The turnips are fed off with sheep, and thus the field is dunged for wheat. It may be doubted whether this is good farming. There cannot be time to clean the land between the turnips and the wheat; and, if the beans are a good crop, but little can be expected of the turnips, to which, however, you run a chance of sacrificing your wheat-crop. It is an attempt to do too much in the time. This plan used to be followed on Sir Wm. Heathcote's home-farm at Hursley, but has been discontinued under the present steward. Farmyard dung is applied liberally, 20 loads per acre, to beans together with turnips, and to the clover-leys for wheat; but the swedes have nothing but bones or superphosphate, drilled with ashes at the time of sowing, again for fear of overdoing the barley.

Below Fordingbridge the usual system is again the four-course. But here also, of late years, there have been modifications on the best-managed farms. Of the wheat-stubble, half is put to green crop, followed by Swedes or turnips; half to mangold, after a winter's fallow. Of the barley-ground, too, half is put to clover, and half to beans or peas After the barley, the half lately in clover will be assigned to swedes or turnips; the other half lately in beans to mangold. The lands are reversed in their cropping, when the crops come round again in the rotation. The advantage of this variation is, that clover, swedes, mangold, and beans each occur on the same ground but once in eight years.

This is unquestionably a very good rotation, but it requires liberal manuring and clean farming, and is pursued on the best farms only, such as that of Mr. H. Bone, of Avon. His bean-ground, when put to wheat, has no farmyard dung, but 1 cwt. of guano, which is repeated as a top-dressing in the spring, and worked in with Garrett's horsehoe; the clover-ley is manured with dung alone; the beans are heavily dunged; the swedes have superphosphate and bones in a crude state, at a cost of 1*l.* per acre; the mangold a sack of bones, 1 cwt. of superphosphate (mixed with ashes and drilled with the seed), together with 2 cwt. of guano and 4 cwt. of salt, broadcasted and dressed in at the same time. The whole of the turnips and swedes and one-half of the mangold are consumed on the ground by the sheep; the remaining half of the mangold is drawn home for the cattle. The green crops are also folded off. The clover is first cut, and then fed, if wanted; if not, it is cut twice. This is a very liberal system. It may, perhaps, be said that if the *whole* of the wheat-stubbles were put to an early green crop, such as rye, and fed off with sheep, something might be saved in artificials to the mangold-crop; and there would still be time for the fold on the rye, for mangolds here are not put in till at least the middle of May, or they run to seed. But would there be time to clean the land, and would the work be evenly distributed?

The average produce of the district is, wheat 32 bushels; barley 40; beans and peas 32; swedes 18 tons; mangold 30; clover-hay 1½. Mr. Bone exceeds, and deserves to exceed, these quantities; for instance, his mangold has reached 45 tons. The live-stock of the neighbourhood receives but little attention as to its breed. The farmers have rights in the Forest, and turn in their heifers there; it has already been seen with what results. The best farmers, therefore, as Mr. Bone, never turn out. They consider that the advantage of scanty keep on a common for a certain time, is more than neutralized by the inferiority of breed thereby necessarily induced. Mr. Bone has all Devons, both for milking and grazing, and breeds his own stock. The same remarks apply to horses, both as to their general inferiority, and to Mr. Bone's superior judgment. He has a handsome cart-stallion, which was second in his class at the Bath and West of England Show at Dorchester; and for his nag mares he has an Arab, purchased of Mr. Alexander Elphinstone, of Chuten Glen, and imported by him. He is now an old horse, and rather long in the leg, as we should think; but his form, his head, his muzzle, the cleanness of his legs, and the docility of his temper, are beautiful. Mr. Bone has some young stock from him, and, if this cross be persevered in, a very superior class of riding-horses will be the result. The sheep are Hampshire and Southdowns, chiefly the former. A few Dorset ewes are kept for early lambs. With a few exceptions, such as Lord Normanton's and Mr. Mills's, there are no breeding and stock flocks, but all is shifting. Ewes are bought in at the fall, lambed down; the lambs fatted off about Easter, the mothers as soon after as possible. I saw on Mr. Bone's farm some fat tegs, 28 lbs. a quarter at 14 months old; and 45 lbs. a quarter at 21 months old. For three years past Mr. Bone has purchased these at Britford Fair, of Mr. James Rawlence, of Wilton. There used to be a practice for the great flockmasters in the down districts to send their chilver tegs for six winter months' keep (from the beginning of October to the beginning of April) to the vale country, paying from 7*s*. to 10*s*. per head. The practice was nearly universal thus to take in sheep for keep, but of late years the vale farmers have preferred purchasing their own stock and fatting it out. The greater increase also, on the downs, of winter food, by means of increased turnip cultivation, may have induced the flockmasters there simultaneously to acquiesce in keeping their sheep at home.

There is no difference observable between the farming on the Avon below Fordingbridge, and that on the Stour.

Much of the high ground about the Stour valley, and thence to the western boundaries of the county, and along the sea-coast, is covered with gravel, and extensively planted with fir. The trees do not grow large, but are stout enough for props in coal-mines, and such like purposes. They are sold on the ground, and shipped at Christchurch for their destination. The excellent judgment of the late Lord Malmesbury originated these plantations.

On the Avon, the water-meadows above Fordingbridge, and the flood-meadows below, and on the Stour the flood-meadows (though, in their present unimproved state, the flood-meadows on both rivers are less serviceable than they might be), alike encourage dairying, which was once almost universal. The cow is the usual nondescript animal, naturalized to the soil, hardy in constitution, and good for milk, but bad for the butcher. The shorthorns, it is said, would be too heavy, and would "poach" the meadows; the pure Channel Islands are not hardy enough. Butter and cheese are made; the night's milk is skimmed for butter the following morning, and then mixed with the morning's milk for the cheese-tub. This is called *half*-skim cheese, and sells for 6*d*., or this year 8*d*., per lb.; but *whole*-skim cheese is more usually made. Dairies are sometimes let at from 8*l*. to 9*l*. per annum per cow; but deductions have often to be made at quarter-day, which upset all calculations. Whether let or in hand, dairying is not profitable, except to the small occupier who is his own labourer. The breed is improved, the condition of the land raised, and more profit derived, from a combined system of rearing, dairying, and fatting, than from either system taken separately. Inferior meadow-land, deficient in the properties necessary for dairy "goods," is yet useful for rearing, and will even lay on fat as well as flesh.

There are at Ringwood some meadows measuring nearly 300 acres,—Upmead, Southmead, Charlmead, and Edemead,—which are held in common, with certain defined property-limitations. Hay is made in the summer, when the stock are in the Forest. On the 10th of September, the horses and cattle are turned in (not sheep, the land is too wet), and are taken out again by 21st of December. Fifty years since they were open common, but at that time rights were ascertained, and allotments made.

As usual, buildings are bad where properties are small, and capital wanting. The little freeholders (and there are many on this, as on the other sides of the Forest) have neither the heart, nor the purse to improve. But lands are being consolidated in fewer hands, and buildings are improving. Mr. Bone has some good accommodation, and Mr. A. Elphinstone erected some excellent premises, designed by Mr. Blundell, at Chuten Glen, though this is a little out of the vale.

There is a "Vales of Avon and Stour Farmers' Club," established in 1850, which meets at Christchurch once a month, in nine months in the year, for the purpose of holding discussions on "the practice and science of agriculture." A South Avon Agricultural Society also holds its anniversary in the autumn at Christchurch, the seat of an ancient agricultural society, which, half a century since, proposed the establishment of a wool-fair here, on the same plan as the Lewes wool-fair. A fortnightly fat stock market, established at Ringwood within the last five years, is in itself a sufficient proof of the agricultural changes and improvements made in the district. For the year ending Lady-Day 1858, the numbers sold were—sheep, 391; beasts, 62; pigs, 210. For 1859—sheep, 509; beasts, 81; pigs, 205; calves, 16. For 1860—sheep, 528; beasts, 69; pigs, 218; calves, 19. This stock is all fatted in the neighbourhood, and is, therefore, indicative of its progress.

The ordinary farm-labourer has 9*s*. or 10*s*. per week. The carter and shepherd have the same, with the addition of a house and fuel (peat and turbary) found them. The average annual expense of manual labour is from 26*s*. to 30*s*. per acre. Tithe and poor-rates vary extremely. Rent is about 30*s*. an acre, and leases are usual on the better farms.

It will be observed that a distinction is made in the Avon country, above and below Fordingbridge; above are water-meadows, below flood-meadows, though these are exceptional. There are water-meadows at Bicton and Ellingham, and one (the last on the river) measuring 80 acres, held in common, just below Ringwood. This distinction arises from the sluggishness of the current and consequent peaty nature of the soil; a fall of eight or nine feet in the mile is required for water-meadows, and that below Fordingbridge is not more than four.

"No country in England," says Fuller, "hath more plenty of clear and fresh rivulets of troutful water." And where trout flourish, water-cresses grow, and stones are covered with lichen, there are the best water-meadows, which are accordingly a feature in Hampshire farming. They are here, on the confines of the county, and in the heart of it on every chalk stream, but none are comparable to those on the Avon. The depth and dryness of the alluvial soil, with a gravel subsoil, is the reason of their superiority over those on the Test and Anton, and Itching, which rest on clay or peat. Indeed the meadows below Romsey, from lying on peat, which is the worst foundation of all, and from their faulty construction, are of little worth.

I will therefore describe the water-meadow system here, mentioning differences between these and others in the county, and noting their influence on the arable farming near them. They are expensive, both to make and to maintain, their construction costing from 15*l.* to 40*l.* an acre, according to the form of the surface. If the soil be not naturally dry it must be underdrained, and that deeply, so as not to interfere with the irrigation. The ground has to be formed by manual labour into ridges and furrows, or, as it is called, "bed-work;" the beds being here 11 yards wide, with an elevation of 2 feet in the centre, but their width generally, and the gradients of their sides, depend much on the soil: the drier this is the broader the beds, and the less the declivity of the sides. The great object is to give the water a quick run, for if it stagnates the grass will suffer in quantity and quality. The water is admitted by a main "carriage;" subordinate carriers or feeders, at different angles to the main, convey the water along the summit of each ridge; the water soaks down and through the sides of the ridges into the drains which run along the furrows; these drains communicate with a main drain ("the drawn"). The used water is not returned to the river for, perhaps, two miles from the spot whence it was originally abstracted; it does duty meanwhile. A "head" meadow is one flooded with the water on its first coming from the river; a "tail" meadow with that previously used in a "head" meadow. Of course the head-water is the best, but to use nothing else would be to divert the channel of the stream. The meadow receiving the tail-water is not (as might be supposed) the one immediately contiguous to that receiving the head-water, but the next but one; if it were attempted to make a tail-meadow next to a head-meadow it would be necessary to raise the water by hatches (which are used to pen back and to direct the water throughout its course) so high that it would flood the head-meadow. The intermediate meadow is generally watered by an "over-carrier" (water conveyed from the river over the "drawn"), the drainage from which empties below into the "drawn." Two or three occupiers may share in the water from one "carriage," taking it, the one from the other, at allotted times. The meadows require a considerable amount of manual labour to keep them in good order, and if this be neglected, coarse, flaggy "water-grass" and rushes will soon show themselves, in which melancholy condition I saw some with cows on them in January, three months after the proper time of "hayning." The meadows having been fed off rather bare about Michaelmas, 6*s.* an acre is paid for "working" the meadow, *i. e.* scouring out the feeders and drains; the hatchwork is repaired, all rat-holes are stopped, and in the beginning of November the meadows receive their first watering, which is a good soaking of a week's duration. There ought to be young grass, about two inches high, on the ground at the time, through which the water percolates, but which it does not cover and so drown. In all watering the grass *must have its head above water*, and much importance is attached to this point. This first watering is given as the river, rich with alluvial matter, first rises from the autumnal rains; and thick water is always best, thin water doing positive harm on a clay bottom. As to the time of application, night is better than day, dull weather than bright. The watering is continued throughout November and December, six days in the week if possible; in January five, in February four; if the frost be hard the water is turned off till a thaw, and if many occupiers participate they take it two days at a time. The meadows are dried the first week in March, are trodden by men's feet (a roller and horses would do injury to the carriers and drains), and about Lady-day the ewes and lambs are turned in, being taken out at night and folded on the arable: they stay in about six weeks, if longer the meadows are liable to injury, and the sheep to the rot. As soon as they are out, the hatches are drawn and the water admitted, but very thinly and scantily at first, in order that the grass may have time to grow above it; two days a week will be sufficient watering, till the grass is cut and hay made in the middle of June. Water may again be applied once a week, and in eight weeks' time there will be a second crop of hay. The autumn feed is for cows.

As to the produce, the spring feed of one acre will easily keep twenty couples, who will fold three-quarters of an acre of arable in the time; each hay-crop will be from a ton and a half to two tons. This is a moderate estimate for the Avon meadows.

The value of the Avon meadows (4*l.* to 5*l.* an acre) is nearly double that of those in the body of the county; indeed there are instances when the turnip crop has failed, of the spring-feed alone being let for 8*l.*, 9*l.*, and even 12*l.* an acre. The meadows elsewhere are "worked" in the same way, but watered rather differently. Where they have an unlimited supply of water farmers put it on and off two days at a time, with intervals of the same duration; they also like to keep the meadows pretty well covered in a frosty time, considering the water a "blanket;" if the supply be limited, one takes it for a fortnight, and stops a month or more before another watering. But this altogether depends on the supply; watering would be *de die in diem*, if possible. The meadows are "worked up" again, when the sheep go out, and have two plentiful waterings for the hay-crop; three weeks the first time, hardly so long the second. The cut of hay is not so good, 1½ ton the first time, 1 ton the second. On some meadows cattle cannot be put in the autumn for fear of treading, nor sheep for fear of the rot.

The connection between water-meadows and arable farming is through the sheep stock. On a chalk farm the sheep are kept partly for their own sakes, partly as manure-distributors on the plough lands. For this purpose they are folded, and when in the fold they receive at all times help from the water-meadows; if it be spring they are on the water-meadows by day, and on the arable (consuming swedes or late turnips) by night; if it be winter they are served with water-meadow hay night and morning. Thus both the spring and summer growth of the water-meadows practically supply the fold on the arable to the extent of 1800 sheep per acre per day. If, again, the turnips should fail, or the season be backward, the sheep stock would be in a critical position but for the spring-feed of the water-meadows. Besides, there is the saving in the growth of seeds. The proportion of sainfoin raised on water-meadow farms is said to be 5 per cent. less than the quantity grown by those farmers who want this invaluable adjunct to every down farm.

MIDDLE DISTRICT.

Uniformity of soils in this *cretaceous district* induces a certain similarity in the character of the farming. This is the country for gentlemen farmers. The farms are larger, the residences superior, the buildings more adequate, the teams finer; everything on a more liberal scale than elsewhere in the county.

There is now very little down left; and what does remain, such as Magdalen Hill, Compton, Tegdown, Chilcomb, and Twyford downs, is as good land for tillage as that which is already broken up, and remains in a natural state for other than agricultural reasons. Some good farmers are of opinion that the practice of converting down into arable has on many farms exceeded its just limits; and that for the flock's health, and as an exercise-ground—particularly in wet weather—nothing can equal the natural pasture of the down. In breaking up, the practice is to pare and burn; then follow roots, wheat, barley or oats, and seeds. After this course the downs require help, and, if once overcropped and impoverished, cannot easily be restored to their former condition.

Almost the whole of a chalk farm is, with the exception of water-meadow which may be attached, arable, only a little pasture being kept about the house. The old rotation on the poorer soils was: 1. Summer fallow or turnips; 2. Wheat; 3. Barley or oats, according to the nature of the soil; 4. Grass; 5. Clover-ley or "old field." On the better soils, the old rotation was: 1. Old field, or summer fallow, or turnips; 2. Wheat; 3. Barley or oats; 4. Grass. The farm was not kept in good heart, nor were remunerative crops raised under such a system. After lying two years in grass, the ground required much cleaning before wheat. In a dry spring this *might* be done in time to get in early turnips, and of these there *might* be a plant, and the crop *might* be fed off (swedes were out of the question) in time for wheat. Here were many contingencies, which did not always turn out happily even on the lighter soils: on the heavier they seldom did, so that a fallow and the loss of a year were too often the farmer's necessity. Then, again, scientific agriculturists objected to two white straw crops in succession, though practical ones did not; all, however, acknowledged that the produce of the "old field" was scanty, and fit for nothing but to run the sheep over, so that here was another year well-nigh lost.*

The change to the now general four-field course (1. Swedes; 2. Barley or oats; 3. Grass; 4. Wheat) was intended to be, and indeed was, a great improvement. But this too, if exclusively applied, was not found to be generally suitable to the country, though it is still invariably followed on some of the lighter and better soils. Without water-meadows there was not enough sheep-food, and the swedes could not be fed off in time for the succeeding barley; much farmyard-dung too was required for the wheat. To meet the first objection, a catch-crop of rye, vetches, or winter oats was inserted between the wheat and the swedes. But the second and chief objection has brought about a new four-course, introduced from the Wiltshire downs, and now extensively prevalent among the best farmers in Hants for a portion (say one-third) of their arable: 1. Swedes; 2. Turnips; 3. Wheat; 4. Barley. Where, however, there are no water-meadows to provide hay, this system is not applicable; and generally, in this case, a combination of the three four-courses mentioned above—the old rotation on better soils, the new, and the Wiltshire—is found very advantageous; or the Wiltshire four may be made a five-course, by the addition of grass. On the poorer soils, rented at 15*s*. or 16*s*. an acre, free of tithes, another five-course is followed by liberal farmers: 1. Turnips; 2. Wheat; 3. Swedes; 4. Barley; 5. Grass. Where there is good strong land, and no restrictions by landlords, there is a three-year course: 1. Wheat; 2. Swedes; 3. Turnips, or turnips and rape, and then wheat again. This liberal system, which, of course, is available for a portion only of the farm, gives much wheat without the dung-cart, and also provides food for many sheep.

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* Mr. Comely of Winchester had occasion to survey twice, in 1838 and 1846, the parish of St Laurence Wootton, near Basingstoke, containing 2000 arable acres. In the former year 500 acres were "old field," in the latter not one. Nothing can show more forcibly the intervening change, which was nothing less than the abolition of the summer fallow, and the gain of a year for a remunerative crop.

But the changes which have been rung on rotations in the chalk district of Hampshire are infinite, and are only to be compared to the algebraic method of "variations and permutations." All, however, have in view the same result—many sheep and much corn—and proceed on the same general principle of not having more than half the arable in corn, at any one time.

The Wiltshire system requires, at starting, a considerable capital. A needy man cannot afford to begin with two green crops; he wants, before the third year, a corn-crop wherewith to pay his way. Still, at the end of eight or twelve years this system is not more expensive than any other four-course system.

The succession of barley after wheat is, of course, the peculiarity (common, however, to the old Hampshire method, and once probably prevalent on the downs in both counties), and with many would be the fatal objection, attaching to the Wiltshire system. The answer, given by the most successful farmers in this county, attributes many advantages to this rotation; no other, they say, provides better-distributed sheep-food, kinder barley, stronger wheat, more economical manuring, or more convenient cultivation.

If barley follow swedes, the latter are in the way of the former; the consumption of the roots must be quickened, or the barley-sowing season will be past. But time waits for no man; so the fold is hurried, and the more haste the less speed. The farmer may be too late, after all his exertions. Besides, if the roots be gone early, and the spring be a little backward, what is to carry the flock on? On the other hand, if another green crop follow the swedes, these may be fed off at leisure up to the middle of May, when, indeed, it is too late for barley but in good time for turnips, and when also the grass will be surely ready for the sheep. Thus there will be an abundance of green food, a regular succession of it, and facility for its leisurely consumption. I have heard the opinion too often expressed to doubt its accuracy, that barley taken after wheat is a more even crop, and of a kinder quality for malting, than after turnips, the folding on which makes the ground too rank for barley; but, what is the barley's bane is the wheat's blessing. This wants manure, and that of the fold is the most economical. The treading of the sheep, too, on the soft turnip-ground (if it rain, so much the better) is highly beneficial, and consolidates the land more than folding on clover-ley would.* There is no presser like their thin, sharp, cloven feet. Wheat thrives here as well, or better on turnip-break than on clover-ley (though this is not the case elsewhere on lighter chalk soils), and, besides, there is no danger of wireworm. The labour also is better distributed for men and horses, who, as well as the shepherd, are hurried at a busy time to get in barley after swedes. There is still an opportunity of slipping in a crop of stubble-turnips, of rye, or of vetches, between the wheat and the barley, if wanted, and circumstances are favourable.

When two turnip-crops are taken in succession, as in the Wiltshire and three-course systems, a larger supply of sheep-food is provided, and consequently a larger stock of sheep kept (the great *desideratum*). The second crop of turnips, after folding on the swedes, is more certain, and increased depth of agricultural soil can be gained. Deep-ploughing is the universal remedy for a thin staple; subsoil must be turned up from time to time, exposed to the air, and added to the surface soil; but for wheat deep-ploughing will not do: the ground is not sufficiently consolidated, and the plant will heave in the winter frosts; moreover, there will be brought up charlock and the red poppy ("the red weed," it is called in this country), which cannot be kept down by any amount of hoeing which wheat can receive, and which will accordingly grow up with and stifle the good seed. Now, for both of the turnip crops you can plough as often and as deeply, and hoe as much, as you like; while in the second turnip crop there is a certainty of effectually subduing the weeds which escaped in the first year, and of leaving the land perfectly clean for wheat.

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* Just by way of contrast, and to show how much good farming is a matter of adaptation to circumstances, it may be mentioned, that Mr Hughes of Thorness is inventing a boarded stage, on wheels, drawn by a wire rope and anchor at the headland, for the purpose of folding sheep. He believes, that if by this means the dung can be had, without consolidation by treading, one of the greatest possible benefits will have been conferred on the heavy land farmer.

Seeds are generally, in this district, sown with barley, and not with oats, the oat-stubbles being put to winter vetches, which are followed by turnips, and so the land brought round to wheat.

The cultivation of sainfoin is a leading feature in chalk-farming; in fact, out of the reach of water-meadows, no flock-master can dispense with it. The hay is the best keep for the winter, the feed for the summer. The early heavy lambs could not be raised without it, and sainfoin aftermath never scours, like many seeds; nor is the plant so liable to failure as clover (though this may arise from too frequent repetition on the same spot); the land rests under it, and (*sic ferunt*) is actually improved by it. The succeeding wheat crop is large in quantity, and excellent in quality, and no other preparation gives wheat a brighter colour or a heavier weight. A seventh or eighth part of the arable is usually laid down to sainfoin, sown, like any other seeds, with barley, when the ground is in good heart, 5 bushels to the acre, with a little trefoil; the common Hampshire sainfoin is generally preferred to the giant. The sheep may be run over it the same season. The first year it is generally fed, sometimes cut for seed; the second year it is cut once, just as it is coming well into flower, and afterwards fed; the third year it is sometimes mown, sometimes continually fed. If, as is often the case, it lies down for four, five, and even six or more years, the land gets foul with running grass, called "black grass," which forms almost a continuous turf. When it stands for the shorter period, the land can be put to wheat, like a clover-ley, and can be brought round again to sainfoin in eight years; otherwise fourteen or fifteen years must elapse before it can be repeated, and the ground should be pared and burnt, and put to turnips. A general and a convenient practice is, to make the sainfoin adapt itself to the length of the rotation, whatever that may be. The hay is of first-rate quality and bulk, a quarter or even a half ton more than clover. There is a great complaint of the adulteration of sainfoin seed with burnet, which is not to be distinguished except the seed be milled, and with difficulty then. This is a mischievous plant, spreading much more rapidly than sainfoin, and choking the good crop.

The sorts of wheat preferred are Spalding, Hopetown, Taunton, Chidham, and Nursery, which last is becoming a very favourite wheat, especially for late sowing. Of oats, Black and White Tartar. Of barley, Chevalier, Nottingham, and Golden Drop. The produce of wheat is generally from 24 to 28 bushels per acre; oats 40; barley rather less; turnips, swedes, and mangolds, 12 to 20 tons; sainfoin 1¼, clover and rye-grass 1.

In the Report on the Agriculture of Hampshire, drawn up by Messrs. Abraham and William Driver, for the Board of

Agriculture, in the year 1794, we read:—"The Hampshire sheep is horned, for the most part with a white face, though some few have speckled faces; formerly they were long-legged and narrow, but now much improved, being short-legged and well carcassed." This description of the "improved Hampshire downs" would not now be recognised. Arthur Young, in a postscript to the Report, intimates the origin of the transformation. "Wm. Poulett Poulett, Esq.," he says, "exchanged, in 1792, a fine flock of Wiltshire ewes (the same as Hants) for south-downs (Sussex downs), and now keeps more than double his former number. He has 1200 sheep on 800 acres." The existing Hampshire downs are "the glory of the county," as respects live-stock. They are the most successful known instance of the permanent effects of a cross in establishing a distinctly new breed. This is a great difficulty. There is a tendency in a cross to revert, after many generations, to one or other of the original stocks—generally to the worst. The peculiar points of excellence in the present race will best appear from a sketch of the two (the Hants and the Sussex) from which it is derived. The old Wilts and Hants breed are worthy of being remembered. They were imposing looking animals, long in leg, high in withers, sharp in the spine, large, bony, narrow, with big heads, curling horns, and fine Roman noses. They died out in Wilts about forty years since, Mr. James Rawlance, of Bulbridge, near Wilton, being their last master. They lived rather longer in Hants, their powers of enduring long travelling and severe folding, hard keeping and hard working, recommending them as the best manure carriers for light lands, which were by this means alone kept in a state of fertility. Such were the Hampshire ewes. In the beginning of this century, rams were procured from the best Sussex downs—less picturesque, but more symmetrical: faces and legs dark brown, fore-quarters wide and deep, back and loins broad, ribs curved, back level, hind-quarters square, tail well set on, limbs short, bone fine, wool close and firm, features intelligent, forehead prominent, and carrying a good crest. A judicious system of crossing preserved the good qualities of both breeds. The hard working qualities, the hardy constitution, and the superior size of the one, have been combined with the smaller limbs, shorter legs, broader back, rounder barrel, more compact frame, increased flesh, and kinder qualities of the other. The horns have disappeared, the colour of the face has turned from white to brown, and there is generally more of the Sussex than of the Hampshire down left. The rams effected the change; the breeder's axiom, that like will produce like, being shown to be particularly true of the male; and the truth of the doctrine confirmed, that the worse bred the female, the more will the offspring take after a well bred sire. Still, even in appearance the new Hampshires assert their descent from old Hampshire mothers. They are larger than the Sussex downs, especially about the head and face—carcase longer and more roomy; generally coarser, and of a heavier frame. Their wool is of a large staple and coarser, not so close; not curling with spiral ends. As to the comparative fattening qualities of the Hants and Sussex downs, an elaborate experiment, recorded by Mr. J. B. Lawes, and reported in the 28th number of the Society's Journal, confirms the truth of the current opinion, that the Hants come earlier to maturity (crosses generally do); but that the Sussex, when ripe, give more valuable offal to the butcher. Mr. Lawes's balance-sheet of the two lots cannot be said to show any pecuniary advantage on either side. The Hampshire were larger, and sold individually for a higher price; but the Sussex realised more money per pound. The Hampshire fleeces also were heavier (perhaps by 1 lb. on a teg); but the Sussex wool at those times made a higher price; now the prices are much the same. Again, you can keep (such is the general computation) 5 per cent. more Southdowns than Hampshires.

But the existing breed has been further mixed. It is not everywhere a simple cross between the old Hampshires and the Sussex. Some thirty years or more since, Mr. John Twynam (now residing at Winchester) put Cotswold rams to his Hampshire down ewes. It was a doubtful experiment to combine long-wool blood with short, and not calculated to found a new race. The relative merits of this cross, and of the pure Hants blood have been fairly tried in the county. A certain number of each were fed together: at the end of the first year the cross was ahead; at the end of the second, the pure blood—a result in accordance with the general rule that a cross is best for early maturity, but not for stock. But, however extensively crossed before, the Hampshire blood is now generally kept pure, though there are not wanting, here and there, signs of degeneracy—sheep with tendencies to hairy wool, big bones, and sour heads; sure indications of the coarse and unthrifty ewe from which they came.

The Sussex downs are in favour with gentlemen farming their own estates, for the finer quality of the mutton; but the Hampshire downs are the tenant's sheep, and the sheet-anchor of his farm. If he can keep one sheep to a pound's rent (and this is a better mode of reckoning than by acreage), it is a good average; and if there be 380 lambs from 400 ewes, or 5 per cent. less than the mothers, it is considered good luck; 360 would be nearer the mark. All are raised for stock. Some of the best wethers (say 100), the farmer picks out for the lamb-fairs at Stockbridge or Overton in July; the remainder he sells from time to time, according to his supply of food or requirements for money, at different fairs, up to Weyhill on the 10th of October, or Andover on the 17th of November, reserving always 140 chilver lambs to replace the one-third of his ewes, which, being full-mouthed, he drafts out of his breeding flock, year by year. No farmer works his own rams, but buys the best blood he can get, and puts them to the ewe lambs at eighteen months old. There are so many noted ram breeders, and so many celebrated flocks, without the absolute pre-eminence of any one or two, in the county, that it would be impossible to particularise all, and invidious to name only a few; but, out of the county, it may be said, there is no Hampshire down blood superior to Mr. Humphrey's, of Chaddleworth.

Of the quality of the wool, Mr. Cunnington, of Devizes, an extensive woolstapler, writes me: "The wool of these sheep is used mainly for the same purposes as that of southdowns. The quality, however, is inferior, to at least 1*d.* per lb. in value, and it does not yield so much of the finer *sorts*. The colour, too, of much of the Hampshire wool (in the neighbourhood of Andover, for instance) is very inferior, being coloured by the red soil on which the sheep lie. In the south of the county, in the neighbourhood of Lymington, some of the wools are as fine and good as any in *this* county, and the colour of these is also very good."

The cropping on a chalk-farm is, as has been already stated, largely influenced by the requirements of the sheep stock. Of green crops, the best sheep food, in early autumn, is rape; then succeed, in order, cabbages (if grown), white turnips, carrots (if grown), late urnips, and swedes, up to the spring, when, but not before, mangold is admirable.

The absence of natural springs on the downs necessitates artificial ponds, to catch and retain the rain water. The bottom is first puddled with clay 6 inches thick, then 2 inches of quick-lime are spread, then 3 or 4 of chalk, then another thin layer of clay, with a coating of chalk over it. The whole surface is then pitched with flint-stones well rammed. This will hold water; but it costs 1*s.* per square foot, besides the hauling, which may cost half as much again.

Sheep fairs are the proper accompaniment of sheep farming. Those of Hants are unequalled—Stockbridge, Overton, Appleshaw, Weyhill, Whitchurch, Winchester, Andover. 65,000 sheep are penned at the famous Overton lamb fair, where the best breeders enter into keen competition for cups given by the Duke of Wellington, the Earl of Carnarvon, the Earl of Portsmouth, Viscount Eversley, Sir F. T. Baring, Mr. Beach, and Mr. Melville Portal, for four classes of wether lambs, one of ewes, and one of rams. At Appleshaw many Dorset and Bridgewater horned ewes, heavy in lamb, are sold, besides Wilts and southdowns. 100,000 are here penned, of which, at a rough estimate, about half are Dorsets, one-fourth Somersets, and the remaining Wiltshire. The first day at Weyhill is appropriated to sheep, the two next to horses and stock, the fourth to hops and cheese. 125,000 may be given as the average of sheep and lambs penned, which are divided between two fairs, the Wilts keeping on their side of the turnpike, the Hants on the other. The hops are similarly separated into a Farnham row and a country row, the number of pockets being about 2500, of which the Farnham people bring more than half.

There is an Andover and Weyhill Agricultural Society, with prizes for stock of all kinds.

The ordinary labourer in this district has 10*s.* per week, the carter and shepherd 1*s.* extra. The carter has perhaps 30*s.* additional at Christmas or Michaelmas. The shepherd has extra pay in different ways. I have heard of this practice—1*d.* for every lamb, and 6*d.* for every one above the number of ewes, to be paid in July. Ploughboys have 6*s.* or 7*s.*; boys to lead, 4*s.* or 5*s.* a-week. The carter, shepherd, and boys are hired by the year; and generally a man's pay is 2*d* or 3*d.* an hour for extra work; the carter probably also receiving 1*s.* on going with a load of corn, or otherwise to a distance. Throughout the county no beer or food is provided, except at harvest-time, when beer is given, often without stint where work presses. Giving food, and no extra money, used to be the practice, but it has died out. The manual labour in the middle district is ·06. The tithe and parochial burdens are not heavy. The rent of land is 13*s.*, 15*s.*, or 20*s.* an acre. Leases are general on these large farms.

On Mr. Melville Portal's home farm, at Laverstoke, a sort of double four-course system is pursued, extending over eight years, thus: wheat, barley or oats, swedes, forward turnips (red-rounds or stone) and rape (first four-course); wheat, barley, grass, roots (second four-course). This is, in fact, the Wiltshire rotation twice repeated, with the substitution of grass for swedes in the second round.

The Laverstoke farm buildings are kept well together, easily accessible in every part, and supplied with all requisites for the conduct of the farm, and for the despatch of the general business of the estate. One excellent feature is the position of the steam-engine, which is fixed, where the heart of the system should be, in the centre, dispensing food, and litter, through the arteries and veins of feeding-alleys, boxes, and yards. The ingenious arrangement for getting at the eggs, without entering the poultry-house, shows that attention has been given to the minutest details. The accommodation for grazing-beasts is perhaps larger than is required in a country, where it is better policy to make dung by sheep folding in the field, than by hauling roots home for cattle in the yard. It must not, however, be forgotten that they were built some twelve years since, when fat prize oxen were thought the right thing everywhere: on the whole, there are few better planned premises for a *landlord* farmer in the country.

As buildings for a *tenant* farmer, those on Mr. Melville Portal's farm at Whitehill may be recommended as a model of compactness, economy, and suitability to the farming of this country. The whole is a rectangular parallelogram, 83 feet by 65, under one roof, with a span of 65 feet—this width being obtained by a lean-to attached on either side of the walls of the main building. The farm consists of 650 acres, and the actual, not the estimated, cost of the buildings was 700*l.*—a little over 1*l.* an acre, double that propoition not being an uncommon calculation. This is an example of adaptation to the present, and the probable requirements of the most approved style of farming in a chalk district, which will surely be followed. Ancient and obsolete fashions are rejected with an intelligent perception of what a modern farmer wants. Large barns are not required at the present day, when the locomotive steamer can thresh out the corn at the rick side. A permanent engine is not so useful as one which can be taken anywhere, and to which the plough or the cultivator, as well as the threshing-machine, can be attached; neither is much accommodation needed for grazing heavy bullocks in a county where the saying is—"The *sheep* pay the rent."

The cottages at Laverstoke attract the attention of every passer-by. The walls are of flint stones resting on brick, carried as high from the ground as the water sputters, with brick facings, and ornamented wood-work gables and porches. Their good looks have caught the eye of the photographer. But your practical man, disbelieving in the union of the beautiful with the useful and economical, asks, "What are they inside; and what did they cost? They *must* be very expensive." This is a mistake. The accommodation is sufficient, and the cost, again not the estimate, of a pair is only 210*l.*, with no cheap materials near at hand, and with lime brought from Teffont, near Salisbury. No ugliness could be cheaper or more commodious than these examples of elegance, convenience, and economy. Mr. Melville Portal's arrangements for letting his cottages are similar to Sir William Heathcote's: those for the carter, the shepherd, and the yardman go with the farm; all others are in the landlord's own hands.

That portion of the Hursley estate which is in, or near, Hursley deserves some notice, not only because it is a considerable and well administered property, but also as a good example of that mixed and varied system of management for grass, arable, and woodlands, which naturally results from the situation at the very junction of the chalk and eocene formations in the south, and the consequently mixed and varied character of the soil. The arable and grass lands are on the London clay, very near the chalk subsoil; while the higher and wooded grounds are composed of the Lower Bagshot and Bracklesham formations, here as elsewhere, in the county, thrown up into gently rounded and undulating eminences.

The home farm comprises 740 acres, of which 200 are arable, 90 dry meadow, and 450 park. The land having been drained and chalked, the foundation of Sir William Heathcote's arable management, now steadily pursued for more than twenty years, is subsoiling. The rotation used to be that commonly followed on these strong chalky clays: 1, fallow; 2, wheat; 3, oats; 4, grass; 5, "old field." If the fallow got the weeds down, the four years' corn and grass gave them plenty of time to get head again. To Mr. William Fowlie, who has now retired after forty-six years' service in the family, belongs the credit of introducing a change which brought up the farm from its old condition, and which, with slight modifications, prevails at present. The course is now one of six years: 1, roots; 2, barley; 3 winter beans; 4, wheat; 5, clover and Italian rye-grass; 6, oats. A good dressing, about 20 cart loads of farmyard dung, is applied, at some leisure time in the autumn, to the oat-stubbles, which are ploughed, in November, 8 or 9 inches deep: Howard's P. P. plough, with the turn-furrow off, and the fin of the share clipt (so as not to take too wide a piece), following as a subsoiler, and requiring only three horses, while the Deanston used to have six horses or eight oxen. The land lies rough all the winter, and requires no more ploughing; but is crossed early the following spring, in *dry weather*, with a two-horse cultivator. An occasional tine with the drags, to break the clods, follows. To prepare the seed bed, the cultivators are again set to work, now in the direction of the ploughing; the rollers and harrows get a sufficient tilth. The seed is drilled on the flat, 27 inches apart, with 6 bushels of bones, or 30 bushels of other drill manure (such as sheep droppings and burnt ashes) per acre. This year 1 cwt. of Prangley's mangold manure (value 8*s.*) and 4 bushels of bones (value 10*s.*) were applied with the drill. Bones have been proved to be the surest and cheapest aid to the productive powers of the soil: in raising the farm to its present condition, as much as 20 bushels per acre have been applied;

but now, owing to deep ploughing, subsoiling, winter exposure, and a six years' rotation, 6 bushels have the effect which 20 previously had; and all other purchased manures are, as a general rule, dispensed with. The horse and hand hoes are kept incessantly at work. Of the crop, it is sufficient to say, that Mr. Charles (Sir William Heathcote's land steward) has for two years successively on this farm carried off the first prize (Sir John Ratcliff's cup), at the Birmingham and Midland Counties Show, for 24 selected roots (6 long red mangold, 6 globe mangold, 6 swedes, and 6 carrots*). The earlier sown and larger roots are hauled to the feeding-sheds for consumption; the later sown and smaller are pitted on the ground for folding. The land being ploughed before Christmas, and broken down by cultivators and drags in the spring, 2½ bushels of barley are drilled to the acre, 12 inches apart. After harvest 20 loads of farmyard manure are ploughed in, and winter beans drilled, 27 inches apart, by the end of October in this manner: three ploughs are set to work, taking 9 inches of land apiece; in the third furrow a hand drill follows, dropping the beans; the fourth furrow covers them in pretty deep, and out of the reach of rooks. Of wheat, 2 bushels are drilled at the same distance as the barley. The seeds are put in at the last hoeing of the wheat, rather late in the spring, so as not to get too high, and interfere with the drying of the wheat at harvest time. Sometimes one, sometimes two, cuttings of grass are taken, before the sheep are turned on. Of oats, 3 bushels produce a better sample than a smaller quantity of seed.

The produce of this farm has been carefully ascertained as follows: wheat, 4 qrs. per acre; barley, 5½; oats, 8; swedes, 25 tons; mangold, 35; carrots, 40.

The live stock consists of 12 horses, 80 horned beasts (16 Ayrshire and Channel Islands cows for the dairy, short-horns for grazing, and young cattle), 300 pure southdown ewes, 100 chilver tegs to keep up the breeding flock, 100 fatting sheep, about 80 pigs; and in the park nearly 200 deer, each of which is equal to 2 sheep.

Another farm in Hursley is interesting, as illustrating the progress of improvement, and as an example for imitation. Land has been here (as it may be with thousands of similar acres in the county) lately recovered from a state of nature. The newly created farm at Ampfield is in a transition state, in part reclaimed, in part wilderness, the one indicating what all will one day be, the other what all the other day was, not "an acre" but "furlongs" of "barren ground, ling, heath, broom, furze, anything." The first operation was to drain the peaty, sedgy parts with

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* Since this was written, the Hursley roots have, for a third time, won this blue ribbon of the green crops.

6-inch pipes 4 feet deep in the mains, and 3-inch pipes 3½ feet deep in the laterals. Chopping and burning at 4*l.* an acre, and chalking at 20 loads an acre followed. Rape, drilled with 12 bushels of bones to the acre, was the first crop, which was fed off with sheep, who had, moreover, hay and cake brought to them. Then come oats or rye, both of which are, according to circumstances, either fed off with sheep, or brought into the rick-yard. This is the introduction to a more settled order of things, turnips and the ordinary four-course system. At first, the 150 acres will be all arable. After cultivation has been pursued through a sufficient number of years thoroughly to eradicate the gorse and destroy its chance of reappearing, about 30 acres will be laid down to permanent pasture. A good house, with barn, and all other proper farm buildings, is in course of erection, on a charming site, which overlooks not only the whole future farm, but some most pleasing scenery beyond it. Of course, the expense of such a creation is considerable (I estimate it at 10*l.* an acre over the whole farm, exclusive of the buildings); but then the increased value, from next to nothing per acre to 20*s.*, is also considerable.

Cottages are built on this property wherever required. They always have three bedrooms each, though the labouring poor are hardly as yet educated up to this additional accommodation, which is often abused, and a lodger taken in, without leave, against rules. A few cottages are handed over to the farmer for the use of his yearly servants; but all the rest are under Sir William Heathcote's own control, although the convenience of the farmer is often considered by the landlord.

One pleasing feature in the management of the estate is, the encouragement of small men in the hope that they may become big men. The allotments, of which there are seven different districts about Hursley, in addition to gardens attached to the cottages, are conducive to this end. The rent is that of the farming land near, with the rates and taxes. The size of each allotment varies from one-eighth to one-fourth of an acre; but, in exceptional cases, where an allottee shows punctuality in his payments, with ability in his cultivation, a few allotments are thrown into one man's hands, who is thus built up into a farmer. One tenant, of more than 180*l.* a-year, who had risen from such small beginnings, having been himself a carter on the estate, died some years ago, leaving two sons tenants of farms here, and one of them a very considerable renter.

Next we come to the subdivision of the cretaceous district in the north-east, the *Hampshire hop country.* The extent to which hops are cultivated in this county has been much underrated. In the Society's Journal it is stated to be 500 acres. I show, from the Parliamentary Return No. 208, 1860, that in the previous year the hop acreage in Hampshire was 1753¼, and the weight grown 2,306,649 lbs.*

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* Parliamentary Return on Acreage and Produce of Hops, No. 208, 1860:—

Collections.	Parishes	Number of Acres.	Lbs. weight charged with Duty
Hants	Aldershott	22	21,636
	Binstead	64	94,037
	Bentley	14	1,700
	Bramshott	14	6,745
	Buriton	14	25,259
	Crondall	153½	171,493
	Dockenfield	13	16,438
	Eastmeon	25¾	26,231
	Froxfield	10¼	11,262
	Headley	17	14,714
	Hawkley	35½	38,715
	Liss	6	5,686
	Prior's Dean	8	7,222
	Steep	31¼	29,797
	Yeatley	26¼	28,505
	Total for Hants Collection	454½	499,440
Isle of Wight	Alton	260½	362,892
	Bentley	149¼	224,740
	Binstead	240¾	410,081
	Coldrey	11½	6,948
	Crondall	9¾	6,903
	Dogmersfield	2½	227
	East Tisted	4½	5,241
	East Worldham	50	85,606
	Empshott	26½	23,829
	Farringdon	17	24,551
	Froyle	108¾	134,473
	Greatham	17½	34,658
	Hartley Mauditt	24	42,566
	Headley	4	13,941
	Holybourne	29	31,798
	Hursley	10	4,590
	Kingsley	57	78,651
	Long Sutton	44¼	60,187
	Newton	6	6,936
	Neatham	42½	44,371
	Odiham	48	50,701
	Selbourne	112½	134,385
	South Warnborough	2	628
	West Worldham	21	18,306
	Total for Isle of Wight Collection	1,298¾	1,807,209
	TOTAL	1,753¼	2,306,649

Ten acres of hops are cultivated at Hursley, 20 miles distant from the usual hop-country. This is an accident. The cultivator, Mr. Porter, is a Kentish man, and tried the experiment in a new locality; he does not recommend others to follow his example, the soil not being deep enough. He grows Golding's, and has, indeed, taken a prize, the quality being good; but though he did grow 14 cwt. one year, the quantity is generally deficient. They come out well in burr, and then fail. The usual hop district is about Alton, Binstead, Bentley, Froyle, Selborne, and Crondal, where the cultivation differs, in some respects, from the account already published in the Society's Journal. Part of this district is in Alice Holt Forest, and has been enclosed and broken up of late years. Land, before not worth 2*s*. 6*d* an acre as wood, has been producing good crops, and paying better than the old hop-land. Indeed, the hop cultivation has generally altered of late years. The practice used to be, to pick out nice little bits of suitable ground here and there, protect them with high hedges, and keep them continually under hops. Now, where there is room for change, after growing hops for ten or twelve years, the land returns to the usual arable rotation, the corn-crops, for years afterwards, showing their appreciation of the previous hop culture. The year's operations commence with *stripping* and *stacking* the poles in October; the farmyard *dung* is then applied, 25 tons to an acre, also soot and rags, at a cost of 7*l*.: if possible, this should be hauled in frosty weather, or at least not in the wet, else the roots of the hops will be torn. If the soil be stiff, 160 bushels of lime are applied per acre, once in seven or eight years. In February the dressing is *dug in* with a three-pronged fork, the stones interfering with more prongs. A difference of opinion exists about weeds; some will not allow a weed to be seen at any time; but, on the other hand, I have been told by a very successful grower that he preferred digging-in pretty high weeds, considering that they opened and improved the soil, and had this further advantage, that they prevented the diggers from scamping their work, because, if the fork was not worked straight down and deep, the weeds would tell tales After the digging, each hill (the position of the plant) is opened, and the sets or runners are *cut off* down to the old "stool." Each root has eight or ten bines, and each bine has one set. Nurseries are made of the sets cut off; the "stool" grows bigger and bigger with age, and, if you cut down to that, there will be plenty of buds left for new bines. The cutting should be completed by the end of March. *Poling* follows. Green bine hops require three poles 10 or 12 feet long; white bine two or three, 14 or 18 feet long. The better the soil, the higher the pole. For material, larch is preferred, but ash, or any wood, is used. It is calculated that 1000 new poles per acre will be required annually, costing, if 14-feet poles, 7*l.*; but a process has lately been adopted by which it is hoped that the durability of the poles may be much increased. The ends are dipped, 2 feet up, in creosote, and boiled for 15 hours, to drive the fluid up the pores of the wood. *Tyeing* succeeds: three bines are tied to a pole as high as a woman can reach (a ladder is not used, unless wind blows the top away, late in the season); the remainder are "*pulled out*"—this is the proper practice. Cutting off, technically called "clearing," is more usual, but is not so good. Rushes, the canvas of old guano bags, or any such materials, are used for tyeing. The land is then "*becked*:" a beck is a hand implement, which combines a fork with three grains or prongs, and a hoe at the back; the fork is for stirring the ground, the hoe for cutting out the weeds. Becking is done twice, if there be time. Surface cultivation by *hoeing* lasts up to the time of picking. "Nidging," or horse-cultivation with hoes or tines, is not thought good hop-farming. "Never let a horse look into the ground, except to cart the dung in frost," is the maxim. *Hilling*, or earthing-up the plant usually begins when the bines are half-way up the poles. These are "half-hills;" "whole hilling" subsequently completes the operation. The hills are 5½, 6, and 7 feet apart, according to the soil. They hill higher here than in Kent, but with doubtful advantage, because the plant is apt to be too much drawn up. The cleaning of the ground is an unquestioned good. During the summer, just before coming into burr, a top-dressing of guano, 4 cwt. to the acre, is applied. *Picking* generally commences in the first week of September. Leaves should be carefully discarded, but inferior and browned hops (the wind has this effect) are not. *Drying* with brimstone brings back the colour, and covers all faults. The effect of brimstone was discovered about twenty years since,[*] and long concealed under the impression that its use was illegal. This proved to be a misapprehension, and now brewers prefer hops so dried, the quality and the colour being alike improved. The hops are taken from the ground to the "*oast-houses*," or kilns, heated with culm and charcoal, where they remain 12 hours, care being taken not to give too strong a heat at first. They are *bagged* by machinery (not by treading, as formerly) as soon as cool. To show the change in fashion, they used, ten years since, to be purposely broken in a rudder; now not a leaf is bruised. Of these operations, digging costs 14*s.* an acre; becking, 6*s.*; laying out poles and putting up, 10*s.*; tyeing and clearing, 10*s.*; flat-hoeing, 4*s.*; picking, 2*d.* a bushel, when a good crop. Taking the average of seven years, all expenses, including rent and duty, amount to 30*l.* per annum per acre. The produce on the same acreage is 12 cwt. The sorts here cultivated are Grape, Green Bine, and Farnham White Bine. Rent is 6*l.* or 7*l.* an acre.

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[*] Or rather re-discovered The Royal Brewer of Eltham was enjoined (temp Hen. VII) to put neither brimstone, nor hops into the ale. Our ancestors had long been used to a sweet and glutinous liquor, and had no relish for the bitter herb. Hops were grown in Kent as early as 1464, but did not come into popular use for more than a century. Indeed, the acceptability of our *bitter* beer is a modern and acquired taste.

Though the cultivation of the hop lends the chief interest to this portion of the county, yet it is remarkable also for its other agricultural productions, being by nature the most fruitful part of Hampshire. From the hill above Alton, on the road to Odiham, you can see the whole of it, from Holybourne, Froyle, and Binstead, to Nore and Selborne Hills, Newton Common, and Petersfield. At Holybourne wheat and beans are taken alternately on the strong land; but this country is very subject to charlock, which cannot be kept down under this rotation, so that the four-field is the more usual. It is both a breeding and a grazing district. There are some rich and dry meadows on the greensand about Kingsley, East and West Worldham, and Hartley; the grass, however, is hardly sufficient to make out the beasts, which are generally stalled afterwards. Mr. John Wood, of Theddon Grange, Alton, grazes many; so does Mr. Chalcraft, of Amery Farm. The produce of this district is: wheat, 36 bushels; beans, 30; oats, 8 or 10 quarters; barley is not much grown. Farnham, Alton, and Basingstoke are the chief markets. Wages are the same as elsewhere in the neighbourhood.*

There is an Agricultural Association in this part of the county, "The North-East Hants." It provides prizes for the labourer and for stock, two-thirds of the subscriptions being appropriated to the first object. There is a Christmas fat show and a July lamb show.

If, before passing on from "the character of the farming" to the next topic, I may be allowed to say one word on the character of the farmer himself, it would be to express my warm acknowledgments to the occupiers of land in this county, for a kindness which a stranger had no right to expect, for a hospitality which never tired, and for a frank confidence which knew no suspicion on the first mention of my purpose.

Let me also mention my deep sense of the great social, and agricultural benefits, accruing to this county, from the constant residence of so many of its proprietors, and from the intelligent interest they take in the cultivation of the soil. They seem to realize the saying of the historian Gibbon, himself a Hampshire proprietor and a captain in the county militia, "I thank God I was born a gentleman, and, above all, an English gentleman!"

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* As the wages of the labourer will not be again alluded to, I may here quote from a Return to the House of Commons (8 Feb., 1861), entitled "The Average

IV. WOODS.

Any report on the productions of the soil in this county would be incomplete, without some account of its woods and woodlands. These are, in the northern and southern, as well as in the midland districts, sources of income to the proprietor, scenes of industry to the labourer, and pictures of beauty to every spectator.

Some most striking native Hampshire trees will not, however, enter into this notice: not the beech, "the most lovely of all

Weekly Earnings of Agricultural Labourers in the Unions of England and Wales" at each quarter-day.

The return, however, is for two quarters only, those ending Michaelmas and Christmas last, and, as far as regards this county, is as follows:—

County of Southampton	Agricultural Labourers	Weekly Wages	Weekly Earnings by Task-work	Allowance of Food or Drink
MICHAELMAS [a]		s. d.	s. d.	
Draxford Union ..	Men .. .	11 0	25 0	Ale during hay-time and harvest.
	Women	6 0	12 0	
	Children under 16	None	..	
Andover . ..	Men	15 6	20 8	4 qts. of beer while carting.
	Women	6 0	7 6	2 qts.
	Children under 16	3 6	..	Same as women.
CHRISTMAS.				
Draxford Union .	Men	11 0	14 0[b]	Ale allowed during harvest and haymaking.
	Women	5 0	..	
	Children under 16	4 0	..	
Andover . ..	Men . .	10 6	11 6[c]	..
	Women	4 6[c]	..	..
	Children under 16	4 0	..	..

[a] As this quarter includes the harvest the average earnings are considerably above those of the whole year

[b] Women and children not employed at task-work except at harvest

[c] Extra allowances to carters for journeys, and shepherds for extra labour, not included. Little work for women at this season

I give this return as coming under considerable authority, but I must confess I attach little value to it. The Andover Michaelmas wages seem to refer to hay and corn harvests, when men are paid for overtime, as already mentioned, under "Labour in the Chalk District."

forest trees, whether we consider its smooth rind or bark, its glossy foliage, or graceful pendulous boughs,"* which is eminently the tree of the chalk formation, and of which the finest examples may be seen at Hackwood: nor the old oak woods, which occupy some of the strongest chalk clays, and of which Micheldever wood is a worthy representative; nor the lines of elms and ashes in the water-meadow valleys; but attention will be called rather to those coppices which are more peculiarly characteristic of the rural economy of the county.

In the north-eastern part of Hampshire there is a saying, "The underwood will buy the horse, the wood the saddle," such is the relative value of the two; whereas, in the south and west, the conditions are reversed—the timber being there the horse, the coppice the saddle. These interchanges of value do not result from differences of soil, nor consist in intrinsic differences of value in the produce: they are purely relative to the market. Coppice in the north-east is greatly enhanced in price by proximity to the hop district, and the special demand for poles there; while in the south, it furnishes materials for barrel-hoops, crates, and hurdles—articles which are supplied from many other quarters, and for which there is no concentrated demand localised anywhere. Hence it comes, that the underwoods of the north-east will realise six or seven times as much as those of the south. In a fall of timber the tables are turned. Management follows the market: in the north-east the wood is sacrificed to the underwood; in the south the tall timber is allowed to assert its natural supremacy and reign over the subordinate coppice.

In the northern part of the county, the woods no doubt originally covered the whole surface, the heavy soil of the vale, as well as the higher and lighter land. Our ancestors extensively cleared the London clay of the vale, leaving trees only in hedgerows, and in belts for shelter. We are now, in the progress of agricultural improvement, felling even these; but the more elevated ground of the Bagshot formation still grows some trees and much coppice.

That these poor siliceous soils should support such fine timber, whether fir, oak, or beech, whether planted or indigenous, may excite some surprise. This vigorous growth may be partly, though not wholly explained, by the presence of spots of clay, here and there affording a firm holding to the roots; or may be rather ascribed to thin veins of vegetable mould, running between the strata of gravel and sand, of which any sand or gravel pit will afford a section to an observer; there is an instructive one in Heckfield Park.

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* Gilbert White's 'Selborne,' part i., letter 1.

No one has more attentively studied the management of underwoods in this part of the county than Lord Eversley. A sketch, therefore, of his procedure will give the most approved practice.

The Heckfield underwoods (and to these attention will be confined) consist of hazel, and chesnut (which has been introduced within the last sixty or seventy years), on the higher and drier grounds; of ash, withy, and alder, on the lower and damper. There is also some oak scrub, which seems to be the natural growth of all the stronger woodland in Hampshire, springing up spontaneously where it has the chance This, being only fit for bavins to burn, is of little value, and would have been of yet less, but for the new buildings which have kept the brick kilns in active work. As fuel for household purposes, the railway has so facilitated the carriage of coal, that the value of oak coppice has fallen from 9*l.* an acre, for nine years' growth, to 4*l.* This will not pay; and the oak scrub is being grubbed, and the land planted to more profitable uses. In providing stock for the vacant ground, Lord Eversley looked at some of his over-crowded woods, and took counsel of the great English master of all practical wisdom. "In coppice woods," says Lord Bacon, "if you leave staddles [stools in West country dialect] too thick, they run to bushes and briars, and have little clean underwood." Some of the Heckfield coppices were "too thick;" but the old stools (chiefly chesnuts), instead of being grubbed up and thrown away, were transplanted bodily into new places. Thus the thinnings of the old wood, furnished the materials for the new. This bold experiment, of which every practical person roundly foretold the failure, has completely succeeded. The single stem of a young plant, newly taken from a nursery bed, is a tender morsel to the rabbits; but the veterans of the old coppice soon set the teeth of all "small deer" at defiance, with their many shoots, and their quick growth.

This transplanting must, however, be done with judgment. To dig a hole and put the root in, is not sufficient: the fern rises and smothers the shrub. The whole ground must be deeply trenched, all the fern and rubbish dug in, and then the new plantation will have a fair chance of rising above the trumpery, and keeping it under.

The underwood is cut, according to its growth and character, every seven, eight, or nine years. The hazel, chesnut, and ash, go for hop poles, and are worth, the best of them, 36*l.*, or even 40*l.* an acre, at nine years' growth. The alder and withy will do for mop handles. The best alder is serviceable for less peaceful purposes. The wood, when barked, will sell for 30*s.* a stack of 12 feet long, 3 feet wide, and 3 feet high, to make gunpowder; but good-sized sticks are required for this, such as may more usually be found in hedgerows, or by the water side, than in plantations. The Crimean war gave a great impulse to the traffic in alders. Many were searched out and cut down then, which would not have been thought of, but for the increased demand for gunpowder. A working woodman of this country is said to have cleared 300*l.* in one year by embarking in this trade. He gave 30s. a stack for the wood delivered at the nearest railway station, and made his profit by retailing it to those who undertook Government contracts.

Another particular in Lord Eversley's management deserves mention. He had a swampy, bad water meadow. Instead of attempting to improve it, he planted it with osiers, which did so well, that they were cut the year after setting, and were sold by auction at 60*l.* for 5½ acres. Here is an anticipation of the period of expectation allotted by Lord Bacon. "In planting of woods you must make account to leese [lose] almost twenty years' profit, and expect your recompense in the end." And yet there has been at Heckfield no "base and hasty drawing of profit in the first years," for the cut of osiers will not be less in each succeeding year, if the plants be well attended to. Lord Eversley has reaped the early harvest, and not despised the caution, "speedy profit is not to be neglected, as far as it may stand with the good of the plantation, but no further."* But the 12*l.* an acre are not all profit. Osier beds are not remunerative, except they be kept clean: in early spring, in a dry time, the hoe must enter them, and not cease working, till the young branches cover the ground, and smother the weeds.

As we proceed from the north-east, across the chalk, to the south-west, we have evidence of the remark that the value of underwood decreases, just in proportion to distance from the hop country, and the demand for poles there. At Heckfield and Dogmersfield, it is at its highest; at the Vyne, lower; at Tangier and Laverstoke, lower still, but as yet more valuable than the timber trees; at Hursley, it has some value, but now less than the timber; while at Minstead, there is a question whether the underwood is worth preserving, and whether cattle should not be turned in to graze among the trees.

The more valuable underwood on the chalk is ash and hazel. A new plantation of this will come, in ten years, to a sufficient growth, and may be cut, every successive ten years, for the first fifty years. After that period it becomes "old wood," and its intervals of rest must be twelve or fourteen years. The price varies from 6*l.* to 14*l.* per acre. The uses are barrel hoops, and close hurdles or wattles—hoop wood being the dearest. The hurdles are so good, that wood proprietors in the north will send to the chalk woods for them, rather than make them out of their own materials at home.

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* Bacon's Essay 'Of Plantations' (colonies).

The former proprietors in this part of the Hants chalk district seem to have taken advantage of the only decent soil on the tops of the hills to plant wood, chiefly oak. On the timber being cut a spontaneous oak coppice springs up, good for nothing but the fire, and choking the more valuable hazel and ash. The result is the same here as at Heckfield and Dogmersfield; the cut of the underwoods has been reduced in price from 16*l.* to 4*l.* an acre. But the remedy is different in the north-east, and here. There, as we have already seen, it is thought worth while to grub the oak scrub, and stock the ground with more valuable wood. This is also thought the more profitable course, midway, at the Vyne, by Mr. Chute, who has planted 100 acres of new woods, and improved his old woods with withy, alder, ash, and, in the drier spots, with Spanish chesnut, believing that no outlay will ultimately be more profitable. Here, however, the hop pole market is yet further distant, and the remedy is extirpation, and conversion of the land to agricultural uses. Mr. Melville Portal, who has at Laverstoke 1000 acres of wood, and the Rev. Bigg Wither at Tangier, seem to have taken the initiative in this change, and their example is being followed in the neighbourhood. Other circumstances have helped on the movement. When the cost of grubbing was 16*l.* an acre, and the rent of the cleared land 10*s.* per annum, the proprietors hesitated to incur such an outlay for such a return; now that the workmen have become more expert with their tools, fair wages can be earned at 8*l.* per acre for grubbing, while the rent has gone up to 20*s.*; the outlay is reduced one-half, the return doubled. Nor does the outlay reach 8*l.*; the old stools are worth something, though not as much as the cost of getting them out. Different bargains are made for clearing; one farmer got a wood grubbed by giving the labourers the stools, the use of horses and carts for haulage, and a crop of potatoes off the ground. In some cases, the landlord does the work at his own cost, making what he can of the old wood, and hands over the cleared land to the farmer at 20*s.* per acre. In others, the farmer clears and pays ten years' rent for twelve years' occupation (the usual run of leases about here): in other words, has the land for two years rent free. But could not the farmer afford to do the clearing, and give the full rent, if the landlord did the chalking? The first three crops would be very remunerative; rape, wheat, and oats, after which the management would be the same as that of the old farm.

The newly grubbed land not wanting help for the first three years, the rape would be fed, in the daytime, by sheep, who would be folded at night elsewhere; or the rape might be cut, and carried away for folding. So that the farmer would get as many acres manured as he grubbed, and two straw crops without any manure.

The very name of Hursley (*hurst-lea*, the "wood-field,") is indicative not only of its original Anglo-Saxon condition, but, which is the more remarkable, considering the many intervening changes, of its present mixed woodland and agricultural character.

Sir William Heathcote's woods are of large extent, and may be divided into those growing on the Bagshot eminences, those on the lower ground of the London clay, and those on the chalk hill sides. On all, the timber, and not the underwood, is the chief object.

If oak be planted on the gravel hills (and it will not grow there spontaneously), nurses are required. Larch are preferred for this purpose to Scotch firs, as coming quicker to maturity, and intrinsically more valuable. They must be thinned out from time to time, and in fifteen or twenty years' time the thinnings are valuable. The larch will do well up to forty or fifty years of age, and are then very profitable. Indeed, the light sand and gravel hills throughout the county cannot be turned to better account, if the proprietor can afford to wait. Mr. Melville Portal has planted upwards of 100 acres, which are doing admirably. On the London clay, oak is the natural production of the soil; and, whatever trees be cut down there, oak springs up. Beech is chiefly planted, with fir or larch for nurses, on the "linchets" (the natural escarpments) of the chalk hills, partly for ornament, partly for shelter.

Underwood in this thickly wooded part of Hampshire is so plentiful, that it is managed chiefly with a view to the welfare of the timber, being cut at intervals of five, seven, or ten years, as the trees want room and air. When these are brought to their maturity, and there is a general fall of the timber, the first next succeeding cutting of underwood will be weak, but should not be delayed on that account beyond five, or, at the most, seven years. At any time, as soon as the grass begins to decay beneath the stems, and the under shoots show signs of weakness, the bill-hook should enter. The rapid aftergrowth will assure the most timid woodman, that it is safer to cut early, for the sake of the underwood itself, to say nothing of the risk, consequent on delay, to the young trees, and the future stock of timber.

For police purposes, the Hursley home estate (so to speak) is divided into seven districts or beats, in each of which resides a woodman, a responsible and trusty man, whose duty it is, to be always on the look out, especially on the skirts of his beat, to see that the woods are not injured by trespassers, ivy, or rabbits (it is hard to say which do most harm), to help the keeper in his work, and to be generally accountable for the safety and well-doing of the portion of the estate entrusted to his care.

V. EDUCATION OF THE AGRICULTURAL POPULATION.

One of the avowed objects of the Society is "to take measures for the improvement of the education of those who depend on the cultivation of the soil for their support." I am, therefore, directly following one indicated line of the Society's operations, in discussing the state of education among the labouring agricultural population of this county.

The importance of this topic at this time is very great, even if regarded from a farming point of view alone. That the present, and yet more the future, success of agriculture largely depends on labour-saving machinery in the field and in the barn; that this machinery requires knowledge and intelligence for quietly working it, instead of carelessly injuring it, or riotously destroying it, are propositions which need no proof.

That there exists a certain amount of apathy and prejudice in the minds of the farmers with respect to the education of their labourers' children, cannot be denied. As a body, they have hardly yet realised their duties, or understood their true interests, as persons largely interested in the intellectual and moral improvement of their labourers. They value, indeed, these things, but think it is not their business, but the parson's, to care for the poor in these respects, not considering that the master's influence is paramount with the servant. They dislike, too, the extension of education beyond (in their opinion) its proper limits. They doubt whether the higher instruction given in the more advanced —or, as a school inspector would call them, the more promising —national schools, tends to make the rising generation more faithful servants to themselves, or more loyal subjects of the Crown. Besides, they find themselves sometimes at odds with the schoolmaster, who wants to keep the children at their learning, while the farmer requires their labour. On hiring a man, a stipulation is not unfrequently made for the services of the boys of ten years old, to assist the carter and shepherd, and their exertions are stimulated by an increase of 6*d.* a week, according to what they can do. "I saw that little chap," said a farmer to me, "take my team down the hill, as proud as a lion, on my raising him." These are permanent engagements. At certain seasons, for bird-keeping, couch or stone picking, girls as well as boys are wanted.

Nor can we wonder that parents should prefer the field to the day school, when two or three children can, without any payment for apprenticeship, at once double the weekly income of the house; when these immediate pecuniary advantages are to be had without any reading, writing, or arithmetic; and when, as far as falls within the observation of a villager, there are but few instances of social advancement consequent on education.

The necessities of the employer and employed alike require, that the years spent by the children of the agricultural labourer at the day school should be few, and attendance during those few years intermittent.

But it would be a mistake to suppose the farmer to be opposed to education generally, or when confined to instruction in religious knowledge, and in elementary reading, writing, and arithmetic. He would indignantly repudiate the notion that the uneducated labourer is preferable to the educated. He values intelligence, good order, and a willingness to listen to reason. He finds a great improvement in these respects: his machinery is now peaceably worked, there are no Jack Straw riots. He believes schooling to have something to do with this change for the better. He foresees that scientific methods will be more and more pursued in agriculture, and that the mental faculties of the labourer will be more and more called into exercise.

I have found among farmers a strong feeling for Sunday schools and winter night schools, the hours for these not interfering with agricultural labour. The Sunday school—an old institution—may be supposed to have lived down any original adverse feeling; but the favour shown to night schools, so recently after their establishment, is a striking evidence of the belief, entertained by a very practical set of men, that they are the right thing for an agricultural district. These schools are also most popular among the poor. The eagerness shown to attend them, and the diligence awakened during attendance, are a refutation of the assertion that the poor do not value education. This complaint of indifference comes from those who expect the poor to keep their children at a day school at a loss of one-third or one-half of their income. Who among their superiors would submit to such a sacrifice? These have an income in relation to which their children's earnings would be inconsiderable, and the prospects of their children's advancement in life are contingent upon a high education. Neither condition attaches to the lot of the peasant.

Night schools, indeed, seem to have arisen naturally out of the necessities of the case, as the best means of supplementing the inevitable deficiency consequent either on the early age at which the day school is left for labour, or on an irregular attendance, or on no attendance there. They may be taken to be one mode, of proved efficacy, for solving that difficult problem in the elementary education of the labouring poor, viz. how to combine instruction with the demand for juvenile labour. No other plan—such as half-day or alternate day schools—has yet been devised which is not open to grave objections. A half-day system will not answer, because the boy has a whole day's work set him, and that very possibly at a distance from home; alternate days will not answer, because every workman's usefulness depends on his acquaintance with his work, and if he be away half his time he is just twice as long learning his business; neither will master, bailiff, or head man be bothered with teaching two sets of boys; they say one is trouble enough. Besides, where are the relays to come from? At pressing times *every* boy and girl is wanted; and even for constant places, in parishes of ordinary density of population, the supply of boys is not beyond the demand. There is no juvenile reserve. The application of these schemes to an agricultural district is an impracticable theory. They proceed on a mistaken analogy between manufacturing and agricultural operations. In the one, there is concentration of uniform work, under cover, in one spot, independent of season and weather; in the other, the work is spread over some square miles, is exposed to wet above and mud below, varies with every season, and is dependent on every atmospheric change. From circumstances so different, the same practical conclusion can not be deduced.

The great majority of schools in the agricultural districts are what are called *mixed schools*, where boys and girls are taught together. There are certain advantages in this social mixture of the sexes in youth, as in all other ages; but, in a sparsely populated district, it is a necessity. There are neither the numbers to supply, nor the funds to support, separate schools for boys and girls.

I have failed, after some endeavour, in obtaining any reliable county statistics as to the number of children at school belonging to that class which "depends on the cultivation of the soil for its support." The figures published by the recent "Royal Commission of Inquiry into the State of Education" give no help. They refer to public schools only (omitting private adventure schools); they include the Channel Islands in Hampshire; and there are no satisfactory means of separating rustic from urban children. The figures for night schools in the Report of the Commissioners are manifestly incorrect. Only 47 night schools, with 1659 scholars, are returned for all religious denominations in Hants, the Isle of Wight, and the Channel Islands; whereas it appears from returns, procured by Archdeacon Jacob, from only 240 parishes, out of 408 in Hants, and the Isle of Wight, at a time of year before the regular season had commenced for opening night schools, that no less than 2131 scholars were attending Church of England night schools alone. The Hon. and Rev. Samuel Best's testimony goes even farther. He writes that "there are very few parishes in the county without them [Church of England night schools], that is, where education is at all attended to." This extension of a system, peculiarly adapted to the wants and opportunities of an agricultural population, is mainly owing to Mr. Best himself, as the secretary of the "Southern Counties Adult Education Society," which, originating in Hants, has spread into the adjoining counties of Wilts and Dorset.

VI. IMPROVEMENTS STILL REQUIRED.

This is an invitation to criticism. Great respect is, however, due to existing practice. Provincial customs, based on the observation and experience of generations, were undoubtedly sound at the time of their formation. They are apt, however, sometimes to endure, by mere force of habit, when no longer suited to altered circumstances. Still, he who would farm for profit, rather than for amusement or experiment, must be careful to make them the basis of improvements, or he will buy his experience very dear. Modern farming, not in this county particularly, is fancy work, very interesting, but very expensive, and by its failures liable to engender mistrust in the minds of practical men—prejudiced, perhaps, but not therefore unreasonable. Let us keep to the old highway, only perhaps in some parts of this county we may improve our pace on it.

In describing "characteristic farms," much has already been said on this topic All, therefore, that is here added, is in the form of inquiries concerning, and suggestions in development of, existing customs.

The northern clays, whilst they are the chief scene of "improvements still required," offer also the most promising field of operation. If the north be now full of want, its future is full of hope. History shows that this was once the most valuable land in the county, and so, with adequate means of cultivation, it will be again, for it naturally abounds in all the constituents of fertility. Here are found most of the residences of the ancient families. We prefer to build our houses where we find a clear climate, a dry soil, good roads, and an agreeable prospect; our ancestors, on the other hand, lived not only on, but by the soil, and kept house on the produce of their own homesteads (the word is significant). Now, where in furtherance of this object did they settle? Is there, in all Hampshire, any seat of agricultural industry more ancient, any more striking old country-house, any (in former times) more highly cultivated, and more valuable land, than the Vyne? And if the Vyne be the first, Beaurepaire and Old Basing are not far behind. All three are on the London and plastic clay; and the two first in the thickest of the thick, the heaviest of the heavy—the "bowl of Hampshire."

The Romans farmed at the Vyne. Lord Sandys' "very great and sumptuous manor-place, with a fair base court, at thys time one of the principale houses in goodly building of all Hamptonshire," is commemorated by Leland in 1540. Its high state of cultivation, and value, are sufficiently commemorated in the land-tax, once the chief source of English revenue. After many variations in assessment, a rate was made under 4 William and Mary (1692), c. 1., by commissioners named in the Bill (the chief gentlemen in each county), at "four shillings in the pound, on what the lands are now worth, to be leased at a rack-rent, without respect to repairs, taxes, parish duties, or other charges." This valuation has remained ever since, and affords a convenient means of comparing rentals then and now. There are three farms on the Vyne estate, measuring respectively 158, 183, 248 acres, the land-tax being 22*l.* 14*s.* 8*d.*, 20*l.* 13*s.* 6*d.*, 25*l.* The rental, therefore, in 1692 may be assumed to have been 113*l.* 13*s.* 4*d.*, 103*l.* 7*s.* 6*d*, 125*l.*; that is, 342*l.* 0*s.* 10*d.* for 589 acres, or 11*s.* 7*d.* per acre. The rent in 1844 (it has since been raised, but merely to pay a moderate percentage on improvements) was 80*l.*, 90*l.*, 200*l.* (a tithe-free farm on a drier soil); that is, 370*l.*, or 12*s.* 7*d.* (nearly) per acre. In other words, while the lighter, more easily worked lands throughout Hampshire, according to the same method of computation, have, during a century and a half of national prosperity, increased in value 100, 200, and even 300 per cent., the heavy clays of the north have advanced less than 9 per cent.—*nihil amplius.*

1. And this brings me to my first inquiry, Has *steam cultivation* received sufficient attention from the agriculturists of this county, particularly in the north?

It may be conceded, that all means of applying steam to the cultivation of the soil previous to 1856 were tentative and costly experiments, such as the tenant farmer could hardly be expected to do more than admire; but since that date, it may be said to have passed from the region of experiment to that of practical application, in the ordinary way of farming business. Accordingly, we find that to the north-west, the north, and on the east of Hants, steam cultivation is in full progress. Mr. T. H. Redman, of Overtown, near Swindon, in Wiltshire, has given me the names and addresses of sixteen persons, who in his neighbourhood are using Fowler's steam-ploughing apparatus on the chalk, gault, and

Kimmeridge clays, and even on the lighter soil of the great oolite. From inquiries I have made in South Berks and the western portions of Surrey and Sussex, I am led to believe that as many as fourteen more are at work there, or thirty in all, on the borders of Hants; and yet I cannot find that one, up to this time, has been bought and used on the mainland of Hants![*] This is not said by way of reproach. The farmers of Hants will not be slow to adopt this, or any other improvement, when once assured of its practical utility. How, then, is this backwardness to be accounted for? It cannot arise from difference of soil, for three-fourths of the lands here, consisting of clays and clay-loams, are as well adapted as any around to steam cultivation; and there is no land to which steam would bring greater gains than to that in the northern division of Hants, none which stands more in need of this aid. There, the farmer has a heavy soil and much couch. Hence his scanty crops, his open fallow, worked with four horses to a plough. Could he follow a good system of autumn cultivation, could he but eradicate the couch, and cultivate deeply in a dry time before winter, a bright future of dry, healthy seed-beds, and consequently of improved rotations and increased crops, would lie open before him. But no draught-power he now possesses, no amount of horse-flesh that he can keep, will enable him to do the necessary work. The opportunities are so few, that he has not the time; and, if he had, the pounding of the horses' feet would only further consolidate the subsoil, and plant yet deeper the noxious weeds, surely to reappear another day. Hence he is compelled to put up with a shallow furrow, with a filthy surface, and with half a crop; while at the same time he supports a team nearly double that which is required elsewhere. Now, what could he do by steam? Immediately his harvest is over, he could seize any favourable opportunity, and do as much in one day as with four horses in seven, do it thirty per cent. cheaper, and in every way better. The land would be untrodden, the tillage would be deeper and more regular, the preparation for the seed-bed incomparably superior. He would have control over the work, both in respect of time, of quantity, and of quality. He would be superior to circumstances, instead of being, as now he too often is, their victim.

The cost of the apparatus would not be alarming, it would be repaid in a season or two (according to the size of his farm) by

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Since this was written, three sets are at work in Hampshire. Mr. Lancashire of Micheldever claims the distinction of being the first agriculturist in the county who has purchased a steam cultivator for work on his own farm. He uses Howard's tackle, Mr. Cooper, also of Micheldever, has Tasker's; Mr. Curtis of Hambleton, Fowler's.

the sale of one-third, or nearly one-half of his stock of horses,* now become unnecessary, by the saving of their keep, and the increase of his crops. But before the tenant can do all this, the landlord has on his part much to do. Mr. Chute's example must be followed. Unhappily steam is not generally applicable to this northern district in its present state. A great deal of preparation is first required. Those favourite double hedgerows must be grubbed, the trees must come down, the ditches must be filled up, the fields must be thrown together, the boundaries straightened, and the whole must be drained (it is useless cutting up wet mould, either by steam or any other process), before steam can show its power. To take and lay out a whole lot of steam tackle in an irregular field of half-a-dozen acres, requiring short turns, is an absurdity. The giant would no sooner get to work than he would have to slacken speed, or he would run into the anchor. Again, farms must be consolidated, and holdings made larger. It might almost be said that no quantity of arable land under 250 acres can authorize the outlay required for implements, and what may be generally called dead stock under the modern system of improved farming; but certainly no occupation under that size will pay interest on the cost of 600*l.* or 800*l.* for steam-engine and tackle. This, then, is the sufficient excuse of the woodland farmer. His landlord must do a great deal before he can do anything. He must cease to be a woodland farmer, before he can be a steam-cultivator.

The neglect of steam in the chalk district, where there is scope and verge enough, is otherwise to be accounted for. Some of the ploughing can be done with two horses (and as yet this is cheaper than steam), but a dry time for working the clays is as indispensable here as elsewhere. To cut these when wet is worse than labour lost. The slices do not split, but contract and harden, and lie about all the summer afterwards in baked lumps as big as the horses' heads. The rain does not soften them, the sun does not warm them, the air does not sweeten them, the frost does not pulverise them: they are closed to all good atmospheric influences. This is true of all clays, but specially of chalk clays.

Probably the chalk farmer would say that his flock pays his rent, and that his present means of cultivation enable him to raise much sheep-food. Besides, there is some uncertainty in the minds of all agriculturists, not as to the benefit of steam, but as to the best of the many conflicting methods of applying it, and whether what is best now, may not be shortly superseded; an obsolete set of steam tackle is not like an obsolete plough or grubber. It is all the difference between 800*l.* and 8*l.* To utilise the speculations of science there is no workman like steady old Time, and some may not unreasonably think that, in so important a matter, he has hardly yet had sufficient latitude given him. The present requirements of the tenant-farmer would best be met by hiring steam cultivators, as now steam threshers. The implement-makers should look to it in this county. The farmers are waiting. "Let 'em come along my way," said one to me, "and I'll give 'em 20*s.* an acre to plough my land ten inches." "A pound an acre?" "Yes, and thank 'em besides."

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* The following are actual reductions of horses, consequent on the use of steam: $\frac{1}{3}$, $\frac{2}{3}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{7}{12}$, $\frac{1}{2}$; the average is $\frac{37}{72}$, or nearly $\frac{1}{2}$.

2. The object of prescribed *rotations*, and of compulsory consumption of the whole of the produce, except the grain, on the farm, is by a system of alternate grain and green crops, and by the maintenance of more live stock, to enable, and even compel, the farmer to maintain the fertility of the soil. Thus the four-field system allows one-half of the land to be sown with corn, one-fourth with grass, and one-fourth with roots—all the produce except the corn to be consumed on the premises; that is, one-half of the land is applied to profitable, the other half to fertilising crops. Now, where the land has been improved in quality, and is not capable of much further improvement (for it is a vulgar error to suppose the resources of the soil to be illimitable), is not the time come for giving a greater latitude to a tenant of approved skill and success? Might not rotations be considered less matters of inflexible legal determination, and more of climate, soil, and even of seasons? Might not the landlord be protected against the deterioration of his land, and even be assured of its yet further development, if possible, by requiring the tenant to keep a certain head of stock, but allowing him to feed them how he likes? We see this practically the method pursued by owners farming their own property (as, for instance, wheat every third year on the chalk soils, and wheat and potatoes alternately on the Bracklesham beds), and we may assume it is found profitable to them, and not injurious to the soil. Of course it may be objected, that a lease is not only to an unquestionable tenant, but also to his executors; and that stock may be here to-day and gone to-morrow. But in Hants twelve years is the usual duration of a lease, which is not so very long a period; and the landlord might reserve to himself a *veto* on any successor, or regulate the cropping for the last two years. The suggestion as to a head of stock is merely an extension of an existing stipulation in Hants leases, which almost invariably require a certain number of sheep to be kept, adding the somewhat unnecessary proviso of cropping for their keeping.

3. Among "recent changes and improvements lately introduced,' and in some places "still required," the *cultivation of*

watercresses must not be forgotten. The watercress-gatherer of Goldsmith's 'Deserted Village' was a decrepit old woman:—

> "Yon widowed, solitary thing,
> That feebly bends beside the plashy spring,
> She, wretched matron, forced in age, for bread,
> To strip the brook with mantling cresses spread."

Cresses used to belong to nobody; stealing them was no robbery. Now they are valuable property, and regularly cultivated for the London market, where they are sold in penny and halfpenny bunches. Land, previously little esteemed, fetches 10*l.*, and even more, an acre. I have heard of a swampy five-acre piece of ground, full of springs, never valued with the farm, which now lets for 45*l.* a year, and will be worth 50*l.* An offer of 300*l.* a year has been made for a bad water-meadow of 20 acres. There are cress-grounds at Andwell, Itchingwell, Laverstoke, Old Basing, and elsewhere. They require some preparation. The surface is first levelled; channels are then made, in which the water (chalk-water is preferred) is kept slowly running two or three inches deep. The soil from the channels is thrown up into beds: in the channels the cresses grow, on the beds osiers. Thus every part is turned to account.

4. There is an improvement which has been "lately introduced" in most parts of the county, but which is "still required" in others—*the application of farmyard-dung to the wheat-crop.* A few years since, the farmyard-dung was exclusively applied to the turnips, thus making them the foundation of the rotation. But turnips require manure in an immediately available shape, *i.e.*, rotten dung, which, however, implies frequent turning in mixens, and consequent loss of ammonia, whereas wheat, which is much longer in the ground, does not require an immediate stimulus (which would force vegetation, and make it winter-proud), so that if green, unturned, unfermented dung be applied to it, labour and expense are saved, ammonia is retained, and the virtues of the manure come into action just when the plant wants them, as it is approaching maturity. As to the turnips, soluble superphosphate will give the rapid start, and bones maintain the growth, which these ravenous feeders once derived, at much waste and cost, from black rotten dung.

5. There are not two opinions on the paramount importance of *chalking* in this county. "It will make clay ground work like a bed of ashes," said one man to me. "Blindfold a ploughman, and he will tell you when the plough in his hands enters the chalked ground," said another. "In a field which I chalked, there were some rails (to protect a quickset hedge) which prevented me from chalking that part; after five years, my hedge was grown, the rails removed, and the whole field, similarly

treated, put to turnips: the crop where the rails originally stood was not one-fifth of that in the rest of the field," said another informant. Now, as to the description and quantity of chalk which should be applied, and as to the frequency of application: the best for manuring purposes is the free, white, friable, soft-natured chalk, easily pulverising, such as is procurable at Arreton in the Island, at Portsdown in the south, and at Odiham in the north of the mainland.* The Odiham pit is well worth a visit; it is the property of Sir H. St. John Mildmay of Dogmersfield, and is the largest pit in the county, and possibly in the kingdom. The area at the bottom is 6 acres, and on the top the circumference is 1 mile. It is a feat of strength for a man standing at the bottom to throw a cricket-ball out of it. The price used to be 1*s.*, but is now 1*s.* 6*d.* per four-horse waggon-load. The chalk is carted to a distance of 15 miles—to Heckfield, Swallowfield, Yately, Blackwater, Eversleigh, Finchhampsted, near Wokingham, and all round the London-clay country. The quantity taken from it varies according to the occurrence of frosts; when the roads are hard, 20 or 30 waggons a day are loaded; the annual average may be put at 2000 loads, carts and waggons together. Last year, however, less than 1600 loads left the pit, and altogether the use is not now so great as it was ten or fifteen years since, either because the land within reach of the pit is already chalked, or from the increased charge. The proper quantity for application, and the necessity of renewal, depend on the nature of the soil; where chalk is wanted as a corrective of acidity in the soil, as after an oak or ash coppice has been grubbed, one good dose of 20 or 25 tons an acre may effect a complete cure, and no renewal be required. On heavy clay lands the use is mechanical as well as mineral, and here as much as 30 tons may be applied at a time. From personal inquiries made throughout the county, I arrived at this rule—that 1 ton per acre per annum is the usual allowance; that is, if 20 tons are applied, the renewal must be in twenty years, and so on; but this rate does not apply to peaty soils, as near Romsey, and about Pagham in the Island. Chalk is wanted near the surface,

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* An analysis of the Odiham chalk by Messrs. Way and Paine has appeared in the Society's Journal, vol xii p. 554 The two following analyses of, 1. Portsdown, 2. Carisbrook, chalks, both dry, are by Dr. Voelcker, and have been kindly given by Mr. Hughes of Thorness

	I.	II.
Oxides of iron and albumina	·24	·23
Carbonate of lime	98·06	97·83
Sulphate of Lime	·35	·46
Phosphoric acid	·10	·10
Siliceous matter (chiefly silica)	1·25	1·38
	100·00	100·00

within reach of the plough and of cultivation; but in such soils it will sink by its own specific gravity, and should therefore be applied at twice, with an interval of perhaps five years between. At the second application the land will be firmer, and not let the chalk in so much.

Trial has been made of the relative cost and effect of chalk and lime. The ordinary calculation throughout the county is, that chalk delivered in the field costs 5*s.* a cart-load, or 5*l.* an acre, if 20 loads are applied. The calculation, made in a particular, but not exceptional instance, for lime was, that in the field it cost 3*s.* per quarter, or 3*l.* an acre, if 20 quarters were applied. But, though this gives a balance of 2*l.* an acre in favour of lime, yet such was the superior efficacy of chalk, that the experiment resulted in the preference of chalk, notwithstanding its greater cost.

6. *Implements.*—All over the county, whether on the mainland, or on the Island, is to be seen the old-fashioned plough, with high moveable carriage or gear. Prejudice is strong in its favour, rather among the men than among the masters. Indeed, I know an instance of a farmer, fully aware of the inferiority of the native implement, yet compelled to adapt a Howard to a high moveable carriage, before he could get his ploughman to use it. Men who have handled the plough—indeed with it in their hands at the time—have given me these two reasons for the preference of moveable over fixed gear: 1, if the plough meet with stones—and there are many everywhere in the county—it will "give somewhat," and not be jerked or thrown out of the ground; 2, the turning at the head-land is more easy; in fact, the ploughman has only to lift the plough out of the furrow, and the horses will take it round without any trouble on his part.

To meet these unquestionable advantages of the detached gear, the two leading implement-makers in the county, Messrs. Tasker of Andover, and Messrs. Wallis and Haslam of Basingstoke, have both patented ploughs. The improvements of the former are designed, by a peculiar construction of the head and beam, which would not be understood by a verbal description without a drawing, to effect these advantages: 1, greater facility in turning, and simplicity of parts; 2, freedom from liability to get out of order; 3, adaptation to diversities of soil and locality, the ploughman being enabled to use the implement as a fixed headed plough on level land, and in hilly and stony ground as a moveable headed one.

But is the machinery sufficiently simple for an implement which will be out in all weathers, and subject to rough treatment, and which ought therefore to be as free from all complication as possible? The action of the contrivance is very nice—perhaps too nice to stand rust and dirt. The screwed stumps for regulating the depth of the work, enabling the ploughman to alter his plough without stopping his horses, is just what was wanted in a "sideling country" like this. The other improvement of the native implement is patented by Messrs. Wallis and Haslam. The beam is loose in a socket at the head of the gear, and so sufficient play is admitted to prevent the plough being thrown out of its work when used in stony ground. The socket also turns every way on a pin, which is in the same straight line with the screw for elevation or depression above. The simplicity of construction is here unquestionable. There is nothing to get out of order.

7. The *buildings* throughout Hants are not substantial, being constructed of bad temporary materials, wood and thatch. It is easy to say they ought to be better, but where are better materials to come from? The newest, and best, retain the wooden walls, though the roof now has slate instead of straw. The use of timber for the sides admits of defence. Stone or brick never keeps the barley dry, the outside grain always threshing badly. Courses of brick as high as the rainwater from the roof splashes, and above them boards,—this is the most approved mode of construction in Hampshire.

8. The *labourers' cottages* are also too often bad, and the problem yet remains to be solved, how to provide decent and comfortable habitations for the labouring poor, and yet at the same time to make the rents a fair return on the capital expended. Whoever discovers a mode of erecting cottages which shall give sufficient accommodation to a labourer and his family, and yet yield a fair percentage in rent, will confer a great boon on all connected with agriculture, from the highest to the lowest. There is no better field for working out this problem than in Hampshire, for nowhere are building materials, with the exception of lime, so deficient. But it is idle to adduce, as admitting of general application, charitable projects which are founded on philanthropy to the disregard of self-interest. The real remedy will meet the requirements both of the tenant and of the builder.

9. *Tenancies.*—There is an arrangement between the outgoing and incoming tenants, which used to be universal in the county; it is going out in the south, but it extensively prevails in the centre, and is general in the north. The change of tenancy as regards the landlord is at Michaelmas, but between the outgoing and incoming tenants there is a joint interest in some of the lands and of the buildings, and in half the house, before and after that date, for more than a year. "They work in and out," as the phrase goes; the incomer works in by entering on such of the land as wants cultivation, and by sharing the stable, on the 1st of February; at Michaelmas he has all the land; he

has, however, only half the residence till the following 1st of May. The outgoer has the other half, a portion of the stable, the barns and sheds: he threshes, and sells his corn, and does not work out till seven months after the expiration of his tenancy.

Arrangements between persons so situated are delicate at the best of times. That a system so surely fertile in causes of disagreement as this old Hampshire custom works amicably (and I am told it does), speaks volumes for the good temper of Hampshire farmers, and the amiability of their wives. Still, the coming guest is not welcomed, the parting guest is not sped; and, as refinement spreads, men of capital, and women of culture, cannot be expected to acquiesce in this joint occupation of house and land. The south is gradually discarding the system. There, as one man steps out, the other steps in. All arrangements between them are made by a valuer on each side, who call in a third man, if unable to agree, which, however, very seldom happens. The valuation of tillages, seeds, purchased manures (all at cost prices), hay and straw at consuming prices, and some arrangement for threshing out the corn in rick, are soon made by two practical men, to the satisfaction of both parties. The tenant gains in comfort, and does not suffer in pocket, if the valuers, as reasonable men, give their award on the fair principle of mutual accommodation between incomer and outgoer. The landlord gains much from a plan which secures to him a tenant of some capital.

The Norfolk system under which payment is for the crop of turnips and for the hay, that is, for results, not for means, is yet more perfect. But whenever I have suggested it to a Hants farmer, the answer has been, "Turnips are a casualty crop; no one can be sure of them."

But changes of agricultural customs require, for their working out, much time, because interests for a series of years are involved, and a man expects to go out on the same conditions as he came in.*

As examples of existing practice in the county, I give abstracts (omitting all those ordinary covenants which require no mention) of two forms of lease, both of which have been carefully considered with reference to existing customs and engagements on the one hand, and approved chalk-farming on the other.

In the first lease the term of years, as usual, is twelve, commencing at Michaelmas. The *tenant* to break up no meadow or pasture land; to keep water-meadows in repair, also all buildings, premises, roads, and ponds, on the allowance, by the landlord, of materials; to paint the house internally and externally every six and three years respectively, on the allowance of paint and oil; to keep hedges in good condition; to cut thistles annually before the 5th of July; not to sell any hay, straw, roots, or manure, but the landlord to have at a consuming price such of the last year's hay as he may think proper; not to take more than two white straw-crops in succession; nor have more than one-half of the arable land in corn at any one time; nor grow broad clover oftener than once in seven years; nor above a certain acreage of it any one year; nor sainfoin oftener than once in twenty years; nor more than a certain acreage of it at any one time; nor less than a certain acreage of two years' growth sainfoin during the lease; not to allow any grass to stand for seed; to cultivate and crop during the last four years of the lease thus (so many acres of sainfoin, of not more than two years' growth; one-fourth of the remainder of the arable fallow for roots, vetches, or rye, to be fed off; two-fourths grain, one-fourth seeds to be fed off, though one-half may be mown); to keep during the whole term so many breeding ewes and fatting sheep; to fold the same after the 1st of May, in the last year, as the incoming tenant shall direct; to fat yearly in the yards so many beasts, not less than two years old.

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* These remarks show a more keen appreciation of the defects attendant on an existing system than of the difficulties connected with the proposed substitute. For several reasons, in Valuations the Outgoer has the advantage over the Incomer; and the capital of the latter is sunk, though not lost. If the new system be *indeed* introduced on the "fair principle of mutual accommodation," it will be a boon, but not otherwise.—P. H. F.

The *incoming tenant* may enter on the 1st of January, in the last year, to carry out the dung, and to prepare for turnips, or, if required by the landlord, the outgoing tenant shall prepare and sow the turnips, and be paid for the crop by valuation on or before the 26th of September [here is the first beginning of the Norfolk system]; the outgoing tenant shall sow the Lent corn, and the incoming tenant may enter and sow the grass-seeds, which the outgoing tenant shall roll and harrow *gratis;* the incomer may enter on one-third of the leys and turnip grounds on the 1st of August, on another third on the 10th of September; shall have after the 1st of January half the farmhouse, half the stables, and the joint use of the yards and outbuildings; the outgoing tenant finding straw *gratis.*

The *landlord* shall allow the outgoing tenant the cost price of all such bones as shall be laid on the farm during the last year, and one-half of the cost price of those laid on during the last year but one, and one-third of the cost price of linseed or oil cake consumed in the last year; the quality and quantity of the bones and cake having been first approved by the landlord.

The variations in the second lease are: the *landlord* may require the surrender of the occupation of any part of the land on condition of allowing the tenant a deduction of 12½ per cent. on the rent, and also paying for all immediate damages or injuries caused by the surrender; shall pay, at the expiration of the term, the value of all sainfoin (not exceeding three years' growth, nor on more than one-fifth of the arable land), and the marketable value of all the last year's hay; shall allow the tenant to sell (after written notice of intention) any hay, straw, turnips, other roots, or green crops (except during the last two years), on condition of purchasing town dung, guano, bones, or other permanent manures of equivalent value, the landlord to be the judge of such equivalence.

The *outgoing tenant* shall have accommodation in the house, barn, stables, yards, and outbuildings, till the 1st of May, after the expiration of his lease, to thresh out and dispose of his corn, and to consume his hay, straw, and roots; or even till the 18th of July, to enable him to thresh and dispose of his corn, if not done before.

The *incoming tenant* may enter on the 1st of November before the termination of the lease, on one-fourth of the arable land not in sainfoin, and require sufficient accommodation for himself, his servants, implements, and horses, in the house, stables, and outbuildings; may enter on the 1st of August following, on an eighth part of the arable land not in sainfoin; the outgoing tenant leaving another eighth part in one or two years' clover leys; shall purchase hay of the last year's crop at the marketable value. [Here is the other particular of the Norfolk system.]

10. Much has been said as to the necessity of *arterial drainage.* "The rivers do *not* run into the sea," as they ought. Winter floods indeed leave a cheap manure behind them, but summer floods are an unmitigated evil: they fill the growing grass with grist, so that nothing will touch it. The stagnation of water at all times is bad. The attainment of an adequate control over a capricious stream implies a unity of management and a co-operation of various interests very difficult to bring about. Yet this combination has been secured in water-meadows, where the water is used by farmers in turns and the law recognises and enforces water-rights. This gives some hope for flood-meadows, such as those below Fordingbridge on the Avon and on the Stour. To see those grounds under water month after month, during the past season was melancholy. Can nothing be done? Something has been done already. Years since the proprietors agreed to remove all the mills and never to permit their re-erection; so there is no artificial impediment here, as often elsewhere.

Another help towards the solution of the question has been given by Mr. Bailey Denton on the river Test. I leave that gentleman to tell his own story in the Appendix. As to the results, from personal inspection of the areas drained I can testify that, at the close of a very wet season, when the water-level would naturally have been on or within a very few inches of the surface, the test-holes showed that the water stood at a depth of 4 feet,* being below the level of the river and tributary streams close by, for this simple reason—that the drainage-water passes under them. There can be no manner of doubt as to the success of this remarkable system of drainage. However, the work cannot stop here. A body of water has been carried from these areas to a lower level, and must be carried on somehow till it reach the sea. For this the co-operation of the proprietors, under some more stringent Act of Parliament than the existing one, is necessary.†

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* Since this was written I have been favoured with the following tabular statement of experiments at Broadlands, showing the depth to which the water has been lowered in the ground by underdraining and the fluctuations in the water level according to the rainfall.—

	Depth of Water in Test-holes below Surface of Ground						Rainfall		
	Minimum Depth during Month		Circumstances under which Minimum occurred	Maximum Depth during Month		Circumstances under which Maximum occurred	Monthly Rainfall at Southampton	Monthly Rainfall at Eling	Number of Days in which Rain fell at Southampton
1861	Ft.	In		Ft.	In		Inches.	Inches	
February	3	0	After 3 days' rain amounting to 0·55 inches	4	1	After 4 days' cessation of rain	1·52	2·92	10
March .	3	5	After 0·55 inches of rain in 1 day	4	3	After 3 days' cessation of rain	1·83	2·25	11
April .	3	9	At beginning of the month	4	4	After continued cessation of rain	0·27	0·39	
May . .	4	0	After 0·95 inches of rain in 1 day	4	5	After continued cessation of rain	1·39	1·56	[illegible]
June .	3	7	After 1·00 inches of rain in 1 day	4	5	At the beginning of the month	3·29	3·94	13
July .	3	7	After 0·87 inches of rain in 2 days	4	1	After 5 days' cessation of rain	3·19	4·59	11
August .	3	10	Little rain	4	6	After continued cessation of rain	0·60	0·60	4
September	4	1	After 0·15 inches in 1 day preceding continuous rain	4	8	After several days' cessation of rain	3·02	3·15	[illegible]
October	4	2	At the beginning of the month	4	7	At end of month, never less than 4 feet 5 inches for 26 days	0·78	0·77	9
November	3	5	After 1·60 inches of rain in 3 days	4	7	At the beginning of the month	4·61	3·50	11
December	3	11	After 0·41 rain in 2 days	4	5	At the end of the month.	1·16	2·02	8

The minimum quantity of water discharged by the underdrains during the above period of 11 months was about fifty gallons per minute, and the maximum quantity exceeded 90 gallons per minute, showing the very large amount of evaporation there must have been before underdraining.

† Further legislation has already applied a remedy. "The Land Drainage Act, 1861," passed since this Report was drawn up, refers (in Parts 1 and 2) to district drainages requiring combined works, and powers are given enabling proprietors of the lower lands to remove mills, dams, weirs, and other impediments to the progress of the upland waters towards their natural outfall on payment of compensation, while two-thirds in extent of the injured district may oblige the remaining one-third to join in the cost. Part 3 refers to outfall works to be carried out by individuals, such as easements for the passage of drainage water through

As to the agricultural results of the Broadlands drainage, the land chiefly affected by it is a fine grass farm, containing about 450 acres, between Romsey and Nursling, called Moorcourt, and the effect has been to reduce the water-meadows there from 100 acres to 25, thus changing the land to dry meadows and introducing the practice of cheese-making. Whether this be an alteration for the better or for the worse remains to be seen. The water-meadows on this peaty soil are far from being equal to those which have a chalk or gravelly bottom; so that their decrease may be compensated by the improvement of all the low-lying, rough, sedgy pasture on the farm, consequent on the improved outfall.

11. There is no county in which more *enclosures*, in proportion to its size, have taken place within the last fifteen years than in this. The return in the note [*] shows that 13,514 acres have been enclosed since 1845. Probably there is but little land left

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the lands of lower owners, the applicant paying all reasonable expenses. The right of landowners to discharge injurious waters through the interposing lands of their neighbours to the natural outfalls is now legalised.—Mr. J. Bailey Denton's paper on Underdrainage, 1861.

[*] NUMBER OF ACRES INCLOSED in the County of Hants since 1845 to the present time:—

Parish in which Land is situate.	Number of Acres
Crondall	84
Newton Valence	170
Tadley	700
Greatham	87
Kingsworthy	487
Illsfield	181
Chale (Isle of Wight)	127
Dockingfield	185
Droxford	1,353
Clatford, Upper and Lower	80
Twyford	647
Aldershot	2,715
Bishops Waltham	322
Bishopstoke	192
Hambledon	487
Binsted	1,137
Bursledon	226
Durley	125
Moresteud	95
Headley	1,668
Bentley	120
Niton (Isle of Wight)	457
Rotherwick	189
Freshwater (Isle of Wight)	100
Yately	1,156
Sheet	280
East Meon	144
	13,514

Inclosure Office, 11 *Jan.*, 1861.

worth enclosing for agricultural purposes, though there is much worth planting with Scotch fir and larch. But the very mention of an enclosure in Hampshire suggests to the mind the greatest work of this kind yet remaining to be done in England.

12. Improvements in the *New Forest* are a very difficult question. There are those who recommend that it should be enclosed for agricultural purposes, just like any ordinary common. Their reasons are that as a nursery of timber for naval purposes, it is not worth preserving in its present state, the whole annual value of the timber supplied to the navy, on an average of the last eleven years, being no more than 6363*l.*; that as a common, the best farmers never use it, preferring good blood to bad keep; that those who do use it would be largely benefited by the increased employment consequent on its enclosure; and that the rights of the present commoners would be defined by commutation.

But he would be a man bold to rashness who would accept as a gift a thousand acres round Burley Beacon, on condition of enclosing and cultivating it. Half of the 63,000 acres are not worth 1*s.* 6*d.* per acre. However, every argument is in favour of in some way utilising the New Forest—in this densely-populated old country we cannot afford to throw away 63,000 acres in picturesque woods and wastes—and as an alternative it may be suggested that this land, so ill-suited to agricultural purposes, should be sold, as it is, for *residential sites.*

We have so little woodland scenery in this populous and highly-cultivated land, and yet we have such a natural and inherited love of the country, with its manly sports, its invigorating pursuits, its local administrative business, and its general political influence, that capitalists from our cities would give large sums, in this climate, for blocks of this forest, on which to build mansions, *provided the trees are left standing, and there is some security for the continuance of sylvan scenery* The timber is invaluable as ornament, which is worth next to nothing when felled. Some fine beeches are at this moment being thrown at Burley Rails, which, standing, are beautiful, priceless pictures, but felled barely worth 50*s.* apiece. Probably they will go as firewood to those who have fuel rights. If anything be done, it must be done quickly, for the destruction of fine timber daily going on will soon render this kind of improvement impossible. The preservation of the woodland scenery is essential to the success of any such scheme. The value of the Forest is now in process of rapid annihilation, under the laudable intention of turning it to account.* The destruction now going on is an irretrievable mistake, however well meant.

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* I have mentioned the names of different gentlemen as having supplied me with information about the Forest. To guard against possible misapprehension, I must state that these views are mine, and not theirs.

VII. "BRIEF HISTORY OF THE NEW FOREST, AND DESCRIPTION OF ANY PECULIAR CUSTOMS CONNECTED WITH IT." *

This, as well as the other royal forests, was in its origin partly demesne and partly prerogative.

Demesne, as being the king's private property, in which not only the vert (small wood and brushwood, shelter for deer) and venison, but also the soil and the timber belonged to him. These may have been the original lands of the Saxon heptarchs, and so, on the consolidation of the heptarchy, they may have been vested in the English monarch. But, however acquired, we find that at the time of the compilation of Domesday-book (twenty years after the Conquest) the Norman monarch was actually possessed of large tracts of woods and wastes of "ancient demesne;" which are generally interpreted to mean lands which belonged to Edward the Confessor, and probably to his predecessors.

Prerogative, as being the property of private persons, to whom the soil and timber belonged, while the rights of vert and venison belonged to the king, who claimed by his prerogative the privilege of afforesting other men's lands, with a sole right to the deer there and to the small wood and covert for their sustenance and shelter. The exercise of this prerogative, however oppressive we may deem it, was probably a commutation of that authority over, and ownership in, the best fish of the sea and beasts of the forest, to whomsoever belonging, and wheresoever found, and by whosesoever labour taken, which the ancient policy of the common law attributed to the king exclusively, and a remnant of which we still have in the presentation to the sovereign of the first sturgeon caught in the Thames. The right of vert and venison were originally, as is supposed, prohibited to all people in all places and reserved to the Crown; so that the restriction of the Crown's right to certain lands selected for the purpose of afforestation, and the admission of the subjects' right on their own grounds in non-prohibited places (which is said to have been done by Edward the Confessor), were, in fact, relaxations of the royal prerogative and concessions to the subject. The universal extent of the king's ownership in all wild beasts and game, and of his claim to all woods and woody places for their abode, and of keeping open wastes for the indulgence of his own pastime in hunting therein, appears in the derivation of the word forest, which is, in fact, the Saxon word *Forst* or *Furst*, *i. e.* Prince. Every forest was the prince's: to whomsoever the soil and timber might belong, the vert and venison were his; a claim to which, even now, the legal *dictum* bears testimony, that only the sovereign can hold a forest—*quâ* forest—at law, and that a forest in the hands of a subject becomes a chace only.

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* My authorities for the history of the New Forest are the Parliamentary Papers, particularly the Land Revenue Commissioners' Report, 1789, the Report of the Royal New Forest and Waltham Forest Commission, with the Sub-Report of the Secretary, 1850, and the Register of Decisions on Claims to Forest Rights, 1858. I am also indebted to the Deputy Surveyor, L. H. Cumberbatch, Esq., and to the Rev. John Compton of Minstead for valuable information on the present state of the Forest. I have for the most part omitted particulars which may be found in popular manuals.

The bearing of this distinction between *demesne* and *prerogative* forest is direct on the history of the New Forest, for it was composed of both. Edward the Confessor had a demesne there, which is mentioned by several writers under the name of Ytene. This the Conqueror enlarged by his prerogative,* gave it the existing name of the New Forest, and described it in that remarkable *cadastre*, Domesday-Book, for its age the most wonderful report (but not the first, for it continually refers to a survey in the time of Edward the Confessor) on the agriculture of a whole kingdom which England or even Europe ever saw.

The extent of his addition, by means of afforestation, to the ancient demesne of the Crown cannot now be ascertained, owing to the difficulty of assigning any certain numbers in acres to the land measurements of the Conqueror's commissioners; *e. g.* a hide has been held to be any number of acres between 60 and 120. We are, however, able to state the extent of the New Forest A.D. 1279. The barons at Runnymede had obtained some articles in mitigation of the royal afforestations. These, with some others, were comprehended in the "Charta de Forestâ" of the ninth year of Henry III. But little was actually done for the relief of the subject till Edward I. (as tenacious as any of his predecessors, but with enlarged views of foreign conquest, which required for their realisation the money, and so the goodwill, of his subjects) took the matter in hand as a popular measure. He first appointed in the above year, the seventh of his reign, commissioners to perambulate and record the then existing boundaries of the New Forest.

The return of the commissioners (the earliest known attempt separately to ascertain the limits of any forest by record) is preserved, and assigns to the New Forest as its boundaries the Southampton Water, the sea, the river Avon, and on the north a line drawn from North Chardford to Owerbridge or Awbridge. This tract may be estimated at 230 square miles, or 147,200 acres, the greater part of which, if not the whole, is mentioned in Domesday-Book as forest (either demesne or prerogative) belonging to the Crown. This survey appears to have been followed by practical results in the relief of the subject; for in the twenty-ninth of Edward's reign (20th November, 1300-1301) another perambulation was made, very materially reducing the limits of the Forest. The boundaries then assigned were afterwards fixed by statute (2 & 3 Edw. III. c. 1), were followed in the perambulation of the 22nd Charles II., in the perambulation of 1801, and exist at the present time.

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* The Norman kings also preserved highly. Whether they destroyed churches and villages may well be questioned. The report of their devastations comes from a source naturally prejudiced. All remains of habitations in the Forest are singularly preserved, and none have ever been found to bear evidence in favour of the Conqueror's depopulations.

These limits are now said to be from Gadshill on the northwest to the sea on the south-east, and from Hardley on the east to Ringwood on the west. The entire acreage of the Forest, within the perambulation, is computed at 92,365 acres. Edward grumbled at the reduction but submitted to it, his poverty, but not his will, consenting. His ambition preferred the acquisition of the principality of Wales, and the probability of the crown of Scotland, to the retention of a few prerogative afforestations adjoining his New Forest demesne. The disafforested land had and has the name of *purlieu.*

Though the boundaries of the Forest were so long undefined, yet unenclosed as it was and is, unmarked by any natural or artificial lines of distinction, and probably by reason of this very absence of boundaries, every spot, however secluded and insignificant, has its proper name;* so that if you drop your glove anywhere in the Forest, a native will go straight to the place on its being named to him, and recover it.

But the entire quantity of 92,365 acres is not now forest, nor is all of it the property of the Crown. Besides ancient independent manors, such as Minstead and Brockenhurst, there are lands within the external boundaries of the Forest belonging to private individuals and surrounded by the royal demesne. No regular perambulation of these, no attempt at legally ascertaining and recording their extent, appear to have been made before 1800, and then by statute (39 & 40 Geo. III. c. 86). They may be supposed to have come into existence since the Crown's relaxation of its forest laws. Under them there could be no enclosures, and consequently the boundaries of these private lands must have been little else than imaginary lines. It appears that previously to James I.'s reign there were but three assart properties in the Forest,* and these do not seem to have been perfectly enclosed. But that king, with his usual facility, made twenty more such grants of assart lands; but still up to the middle of the last century there were but few enclosures. Then, however, the landowners within the Forest began not only to enclose their own lands, unenclosed for centuries, but also to encroach on and enclose the demesne lands of the Crown. Hence the legislation in 1800. The verderers, master-keepers, and other officers of the Forest, who ought to have taken notice of and abated these unlawful enclosures, were themselves generally local proprietors, and so busily employed on their own behalf as to be hardly able to interfere with those who were only following the example of their betters. The effect was doubly injurious to the forestal rights of the Crown: first, in the reduction of the area of feed for the royal deer, which may be put at from 4 to 3; next, in the claims of the landowners, who, after enclosing the lands, demanded for themselves and their tenants (thus multiplied by the enclosures) a right to turn out their stock (increased five-fold), horses, cattle, and swine, to share with the royal deer in the reduced extent of pasture. No wonder the deer were starved out by a surcharge of cattle on a diminished area.

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* So also in other forests. "Wild as this immense tract (Blair Athol) is, every rock, corrie, cairn, and mountain is distinguished by some particular name, *nullum sine nomine saxum*; and there are numerous subdivisions which indicate every precise spot so that the men appointed to bring home the dead deer, being thus told where they lie, never fail to find them."—Scrope's 'Deer Stalking.'

The practice of government and the administration of law in the forests appear, in Saxon and early Norman times, to have been based on the theory, that they were places out of the kingdom, as it were, subject to no other law than the arbitrary will of the monarch. Gradually the judicial system for the administration of forest law appears to have resolved itself into three tribunals, somewhat corresponding in their action to the several functions of our ordinary magistrate or justice of the peace, jury, and judge. The duty of the first—called originally the Court of Woodmote, but of late, from the nature of the business there transacted, the Court of Attachments, and again, from the times at which it ought to be held, the Forty-day Court—was to receive the attachments of the foresters, and enrol them in the rolls of the verderers who attended this court. This preliminary step was in its nature a committal. The duty of the second, called the Court of Swainmote (*i. e.* the meeting of the swains or freeholders), was to receive the presentments enrolled in the court below, and to proceed to trial and conviction thereon, as a jury does, but without any power of giving judgment and of fining or otherwise punishing. This power belonged solely to the third and supreme tribunal, which was that of the Chief Justice in Eyre, thence called the Court of Justice-seat. The specific function of this court was to deliver judgment and to pass sentence, on convictions made by the court of swainmote, on attachments made by the court of woodmote.

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* "Assart lands," *agri exarati*, either with or without leave. To assart lands without special licence was an offence against Forest Law.

Such was the original triple system of the forest courts. All three were essential to the administration of justice. The disuse of any one would cause a failure of justice. Now when it is mentioned that the Court of Justice-seat, which only could punish any offences, and which ought (according to the New Forest charter) to be held every third year, became irregular in its meetings in the sixteenth century, and that since then only two courts have been held (viz., in 1634 and 1670), the small degree of observance which has been paid to the forest law in the New Forest for 300 years may be imagined. Nor was neglect confined to the judge's office. By the New Forest charter the swainmote court ought to meet three times a year, fifteen days before midsummer to clear the forest during the fence-month (20th June to 20th July), to fawn the deer, and to provide for the agistment of cattle when the fence-month was over; secondly, fifteen days before Michaelmas, to receive the agistment-money for cattle, and to provide for the pannage of swine; thirdly, about Martinmas (11th Nov.), to receive the pannage-money: whereas it appears, from 1745 downwards, to have met but once a year, generally on the 26th August. Since the disuse, however, of the justice-seat, the Legislature, in 1698 and in 1800 (9 and 10 Will. III. c. 36, 39, and 40; Geo. III. c. 86), made some attempts to keep order by enlarging the jurisdiction of the verderers.

The jurisdiction of the forest courts now ordinarily held is compounded of the imperfect remnants of the old forest system and fragmentary additions from modern enactments. The improvement of late years, in this and every other respect, is manifest. The administration of justice rests with the four verderers, who are elected by the freeholders. There is now no lord-warden: the office has not been filled since 1850. The present verderers are, Sir Edward Hulse, Bart., H. C. Compton, John Mills, and A. R. Drummond, Esqrs. They meet every forty days, and act as justices of the peace do. Their penalties are fines and imprisonments. The offences of which they take cognisance are, damage of any sort to the soil or the property in the Forest. Cases which might not seem to come under their jurisdiction are taken before the county justices.

The rights or interests claimed in the New Forest are—common of pasture for cattle, of pannage for hogs, and of turbary, fern, furze, heath, &c., besides rights of fuel-wood, of gravel, marl, &c. These rights over the demesne-lands of the Crown had their origin for the most part in an equitable claim for compensation attaching to private owners, whose lands had been afforested by royal prerogative. If the king might turn his deer into other men's lands, require them to provide pasture and shelter, prevent them from enclosing, cultivating, or improving their own property, clearly they were entitled to certain rights and privileges in return over the Royal demesne which adjoined their lands. *Qui sentit onus, sentire debet et commodum.* But then, on the other hand, when their lands were disafforested, and the exercise of the royal prerogative over their private property ceased, the exercise also of their claims on the royal property should have ceased also. Discharge from forest burthens in all reason implied discharge from forest rights. The latter alternative the claimants did not recognise. They received immunity, but did not give it. The Crown endeavoured, in the sixteenth and seventeenth centuries, to impress on them the anomaly of which they were guilty, but without success. The state of the New Forest, in regard to the exercise of these rights (particularly that of pasture—the most valuable), is said, on the authority of the Commission of 1850, "to be little less than absolute anarchy." The neglect of the forest law raised doubts as to whether it could be revived; while it was confidently asserted that no other law, whether common or statute, was current in the Forest; and consequently, that there was no power lodged in the officers to interfere for the purpose of checking usurpations. Squatters accordingly came and settled in the Forest, who could not legally acquire, but nevertheless exercised, common rights, to the prejudice o the Crown and of those who were entitled to them. It is in evidence (Commission 1848-9) that not only did many persons turn in cattle without right of pasture, but "nearly all the neighbours from Christchurch and Ringwood and all around the country" did so; while those who had rights turned in without any regard to the extent and limits of those rights. People from Dorsetshire and Wiltshire, who had no forest rights at all, purchased large quantities of cattle and swine, made some underhand arrangement with an individual who had rights, by the possession of an acre or two within the Forest, who accordingly took the cattle on his own premises, perhaps for a day, and then turned them into the Forest. One family is mentioned which alone used to do this to the amount of 4000 or 5000 head of cattle a year. The right of fuel was equally perverted. It applied originally to "such wood as is decayed, dry, and dead," and was for the recipient's personal and family use only; whereas it was the practice to assign and take sound beech timber, and latterly beech and fir in equal quantities. The allowance of such decayed wood for the purpose of actual home consumption, especially to the poor, seems reasonable and charitable; but it was habitually and regularly sold in the way of trade. It was no longer a Crown bounty to the poor forester, but a matter of speculation and profit in the hands of the rich. To crown all, fuel was claimed and assigned, in spite not only of forest law, but also of statutory enactments (9 and 10 Will. III.), for houses which did not exist.

The history of all the other rights is the same. The Crown began, 800 years ago, by encroaching on the subject, who, in his turn, has encroached on the Crown. The tables have been completely turned, so that the value of the rights claimed by private persons over the Forest would (as is asserted) absorb its whole value, leaving nothing to its original, but now nominal, proprietor.

Some order has been recently introduced. Commissioners were appointed under the 17th and 18th Victoria, cap. 49—an Act for the settlement of these claims, which have been ascertained, decided, and registered. 1311 claims are allowed—some very extensive, some very minute. Right of common pasture may be exercised throughout the year, except during the fence-month (20th June to 20th July), and the time of winter-hayning (22nd Nov. to 4th May). Sheep are allowed only where expressly mentioned. The right of mast can be exercised in the pannage-time only (25th Sept. to 22nd Nov.) on payment of 4*d.* for every pig above one year old, and 2*d.* if under that age. Every exercise of turbary-right must be under the view of the foresters, and the fuel must be burnt in the messuages mentioned in the register. The right of wood must be similarly exercised. The payments to the Crown for the use of these rights vary from one penny to a few shillings.

There are no statistics as to the number of animals turned out, as only a portion of them go through the hands of the agistors. It is proposed to remedy this defect by legislation.

The statistics of the Forest in its present state are these:* freehold estates, within the external perambulation of the Forest, belonging to private persons, 27,140 acres; copyhold, or customary lands, belonging to Her Majesty's manor of Lyndhurst, 125; leasehold under the Crown, granted for certain terms of years, 600; enclosures held with the lodges, 500; freeholds of the Crown planted, 1000: total of permanent enclosures 29,365; remainder, being woods and wastes of the Forest, 63,000.

The Crown forest property is divided into two districts, the western and eastern, between which run up the manors of Brockenhurst (Mr. Morant's), Lyndhurst (the Crown's), and Minstead (Mr. Compton's).

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* These figures have been supplied to me by the Deputy Surveyor. The statistics usually published show the state of the Forest in 1789, and are taken from the Parliamentary Report of that date.

The following financial statement of the receipts and expenditure, for the year ending 31st March, 1860, is taken from the last (38th) Report of the Commissioners of Her Majesty's Woods and Forests:—

RECEIPTS.

	£	s.	d.	£	s.	d.
Sales of navy timber	10,142	6	7			
Boat crooks	72	16	9			
Rejected timber	556	0	0			
Other timber	1,641	6	11			
Bark	4,683	14	3			
Poles	966	4	1			
Stackwood	61	11	0			
Fagots	753	18	2			
Fathomwood (firewood)	396	0	6			
Miscellaneous wood	434	15	3			
Oak, fir, and holly plants	262	15	9			
Grass	1	5	6			
Marl	3	9	0			
Gravel and sand	96	1	1			
				20,072	4	10
Value of trees and plants removed from nurseries to plantations, of timber wood for lodges and fences, of fuel, &c. (accounted for, other side)				1,392	15	4
Rent of cottages, of tilery, forest dues, fees on sporting licences, fines on pounded cattle, pannage of hogs, sale of venison, &c.				1,089	9	10
Rent of Burley Rails Farm and interest on drainage there				170	14	8
Ditto, new Park Farm				400	1	10
				23,125	6	6

EXPENDITURE.

	£	s.	d.	£	s.	d.
I. Planting, new works, and improvements	2,827	15	0			
Value of trees and plants, and other outgoings (other side)	1,100	2	0			
				3,927	17	0
II. Maintenance and general management:						
Salaries	2,539	8	4			
Labour and artificers' bills	4,411	2	7			
Outgoings (other side)	162	19	0			
Carriage of timber to Portsmouth, criminal prosecutions, compassionate allowances, &c.	1,871	14	8			
				8,985	4	7
Total expenditure				12,913	1	7

To this may be added the following figures, from the same

Report, for the same year, relating to the other royal forests in this county:—

	Receipts.				Expenditure.		
	£	s.	d.		£	s.	d.
Alice Holt	1,496	8	11	..	1,146	3	0
Woolmer	1,290	10	5	..	308	0	2
Bere	3,016	17	3	..	1,061	18	6
Parkhurst	819	12	9	..	843	18	10

Alice Holt and Woolmer are, in fact, one forest, divided by intervening property, much as the western and eastern districts of the New Forest. The former has been much enclosed, but still has 780 acres of woods of the Crown. Woolmer is only partially in this county. It never had (as Gilbert White's description of its soil shows) much wood: it is now enclosed and planted wherever worth enclosure. The rights of the commoners were commuted for land, under an Act of Parliament for the purpose, about two years since. Bere is all enclosed, and about half of it under cultivation. Parkhurst is little else than a plantation of Scotch and larch nurses for oak. All these figures show, to those who have read Parliamentary Reports, a vast improvement in the administration of these forests within the last ten years.

APPENDIX.

1. METEOROLOGY.

RESULTS of OBSERVATIONS at the SOUTH CAMP, ALDERSHOT, Lat. 51° 15′ 25″ N., by Negretti and Zambra, and have been compared with Standard Instruments, and

YEAR AND MONTH.	Pressure of Atmosphere in Month.				Temperature of Air.						Mean Temperature.	
								Mean				
	Mean.	Highest.	Lowest.	Range.	Highest.	Lowest	Range	Of all Highest.	Of all Lowest.	Daily range.	Air	Dew-point
1860	in.	in.	in.	in.	°	°	°	°	°	°	°	°
January . .	29·730	30·306	28·757	1·549	56·0	27·0	29·0	45·4	34·9	10·5	40·0	36·2
February . .	29·964	30·600	29·335	1·265	52·0	23·5	28·5	42·7	29·0	13·7	36·1	31·3
March . . .	29·919	30·520	29·202	1·318	58·0	26·0	32·0	47·7	35·1	12·6	41·0	37·1
April . . .	29·988	30·405	28·816	1·589	67·0	27·0	40·0	54·9	34·5	20·4	45·4	40·3
May . .	29·918	30·386	29·480	1·906	79·0	31·5	47·5	64·7	43·6	21·1	54·4	47·4
June . . .	29·804	30·176	29·438	0·638	70·0	44·0	26·0	63·7	47·5	16·2	54·9	49·8
July . . .	30·012	30·389	29·743	0·643	80·5	44·0	35·5	70·1	56·4	13·7	57·7	53·5
August . . .	29·771	30·059	29·424	0·651	74·0	45·0	29·0	66·8	51·3	15·5	57·1	53·4
September . .	29·933	30·385	29·485	0·900	70·5	36·0	33·5	62·4	45·6	16·8	53·0	50·0
October . .	30·026	30·355	29·517	0·838	68·5	30·0	38·5	58·0	44·1	13·9	51·1	46·8
November . .	29·863	30·508	29·357	1·149	56·0	29·0	27·0	47·1	35·2	11·9	40·8	37·1
December .	29·670	30·309	28·791	1·518	54·0	8·0	46·0	49·4	31·2	9·2	37·0	30·5
Mean, 1860 .	29·887	30·367	29·279	1·088	65·4	30·1	35·3	55·3	40·7	14·6	47·2	42·8
Mean, 1859 .	29·932	30·369	29·311	1·058	72·1	31·4	40·7	59·5	43·2	16·3	51·5	45·2
Mean, 1858 .	29·943	30·250	29·319	0·931	71·0	31·8	39·2	57·7	41·1	16·6	49·0	43·2

1858. The maximum temperature of air in 1858 occurred on the 15th June, and was 90·5°. The lowest reading occurred on the 24th November, and was 19°. The extreme range was therefore 71·5°. Maximum reading in sun occurred on the 15th June, and was 110·0°. The highest reading of barometer occurred on the 25th September, and was 30·200 in.; the lowest on the 7th April, and was 28·720 in. The most remarkable fall of rain occurred on the 14th August, and was 0·900 in.

1859. The maximum temperature of air occurred on the 12th July, and was 93·0°; the lowest reading occurred on the 25th October and 19th November, and was 23·0°. The range was therefore 70·0°. The maximum in sun occurred on the 12th July, and was 107·0°, minimum on grass, on the 24th October, and was 18·0. Barometer, highest reading on the 10th January, and was 30·682 in., the lowest on the 10th December,

APPENDIX.

METEOROLOGY.

Long. 45' 36" W.; height above sea-level 325 feet. The Instruments employed are the observations have been reduced by means of Glaisher's Hygrometrical Tables.

Vapour.			Mean Degree of Humidity. Scale 0—100.	Mean Weight of a Cubic Foot of Air.	Mean Reading of Thermometer		Wind.					Mean Amount of Rain.				Amount of Evaporation.
	In a Cubic Foot of Air.							Relative proportion of								
Elastic Force.	Mean.	Short of Saturation			Maximum in Rays of Sun.	Minimum on Grass.	Estimated Strength.	N.	E.	S	W.	Ozone.	Cloud.	Number of Days it fell.	Amount.	
in	gr	gr.	°	gr	°	°	0-6					0-10.	0-10.		in.	in.
214	2·5	0·3	88	545	51·5	27·2	0 5	5	3	9	14	1·4	6·1	17	3·115	0·015
·174	2·0	0·5	81	554	51·2	20·5	0·7	12	3	4	10	1·0	6 8	8	0·750	0·795
·221	2 5	0·5	86	549	58·5	30·4	0·5	7	2	9	13	1·5	7·3	19	2·150	0·187
·250	2·9	0·6	83	542	65·9	30·3	0 6	5	14	3	8	1 6	5 3	10	1·642	2·695
·328	3·7	1·1	75	532	77·4	40 4	0·4	5	5	8	13	1·3	5·6	16	2·348	4 850
·358	4 1	0 6	85	530	73·7	46 2	0·4	2	3	9	16	2·3	7 4	25	5·490	3·010
·411	4·5	0·7	87	531	84·0	54·3	0·4	9	10	4	8	3·1	7·5	13	1·773	2·180
409	4·6	0 7	85	530	78 5	48 3	0 5	4	0	5	22	1·8	7·9	23	4·754	3·195
361	4·0	(·4	89	534	75 2	42·4	0·2	9	7	6	8	0·8	5 2	13	3·405	2·560
·325	3·6	0·6	86	543	67 0	40·7	0·5	9	2	14	6	1·2	5 9	12	1·810	1·795
224	2·7	0·5	85	554	55·4	31 2	0 4	3	13	10	4	1·5	5·8	12	3·100	0·785
173	2 0	0·6	80	555	44·5	27 8	0 6	14	3	10	4	1·5	7 4	14	3·080	0·325
															Totals.	
·286	3 1	0 6	84	543	65·2	36·2	0 4	7	5¼	7¼	10¼	1·5	6·5	15	33·417	22 372
															Totals.	
·391	3 6	0·8	84	537	69·6	41·4	0 6	7	5	7	11	1·4	5·4	13	30·857	30 229
·280	3 1	0·8	80	544	.	..	0 7	9¼	6	11	4	2·2	5 7	10	16·450	.

and was 28 586 in. The most remarkable fall of rain occurred on the 20th September, and was 2·800 in.

1860. Maximum temperature of air on the 14th July, and was 80 5°, the lowest on the 29th December, and was 8·0°. The range was therefore 72·5°. Maximum reading in sun on the 13th July was 96·0°, minimum on grass on 29th December was 3 0°. Barometer, highest reading, 14th February, and was 30 600 in., the lowest, on the 14th January, and was 28·757 in. The most remarkable fall of rain occurred on the 2nd of June, and was 0·900 in.

I regret I cannot infer much from the above, as the weather during the period has been evidently anomalous.

JOHN ARNOLD, A.H.C., M.B.M.S.

2. *Description of the Drainage of a portion of the Valley of the River Test at Broadlands.*

In the autumn of the year 1852 I made a survey, as engineer of the General Land Drainage and Improvement Company, of the valleys of the rivers Test and Anton, and addressed a Report thereon to the owners of land in those valleys, in which it was recommended that the whole district should be divided into several smaller areas, wherever an outfall could be obtained for effective deep drainage, without the destruction of mill property.

The nature of the valleys favoured this subdivision, as will be seen by the following description:—

"The rivers Test and Anton take their rise in the southern chalk ridge, popularly known as the Hog's Back, which extends across the kingdom from east to west. Each river pursues its course in a southern direction between the hills which branch from the main ridge and have a lateral inclination towards the south. The two rivers then unite at Fullerton, and though frequently divided again into several channels, flow down one valley between a continuation of the chalk hills to Romsey; near which place the chalk undulations become altogether covered with the gravel and clays which are the varied constituents of the Tertiary formation. Several of the chalk hills on each side of the valleys, and indeed at the sources of each river, are capped with the clays of this formation, which give an essential character to the alluvial deposit throughout the valleys, and, in combination with the accumulated vegetable matter incident to excess of water, form the prevailing soils of the valleys. From Romsey the river flows through the same alluvial deposit, but with a smaller proportion of peat, into the sea at Redbridge.

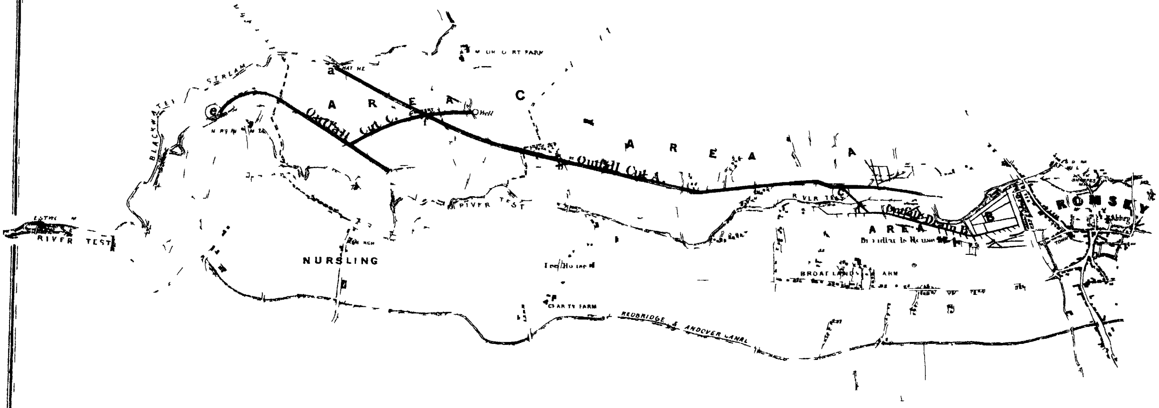
"The formation of each valley above Romsey is marked by great irregularity. In one place the chalk sides approach within 32 chains of each other, in another within only 23 chains, and in a third within 16 chains; while above the several necks, or passes, plains exist of 89 chains, of 48 chains, and 40 chains wide.

"The fall, or inclination, of the valley surface from

	Feet.	Feet.
Andover to Fullerton is	47	
Whitchurch to the same spot	..	.. 88
Fullerton to Romsey	93	.. 83
Romsey to Redbridge at low water neap tide ..	50	.. 50
Total fall from Andover to Redbridge ..	190	
Ditto from Whitchurch to Redbridge		.. 221

"These extreme falls give a mean inclination or average of 9,257 feet per mile. The mean rate of inclination, however, not being preserved, in consequence of the irregularities in breadth and other impediments, or bars peculiar to the undulatory base of a chalk valley, an irregular velocity has been given to the water flowing down the valley. The alluvium has thereby been deposited partially, and vegetable growth has accumulated in the broader spaces, or basins, where the water has been less rapid in its passage. It is necessary to give a vent or outlet to these basins It is also to be observed that the general inclination of the water level in the surrounding chalk approximates the surface line of the valley, when that water level is at its greatest depression. As the chalk becomes replenished by winter rains,

Plan showing so much of the Drainage works in the Valley of the Test as have been executed for the Right Honble Lord Viscount Palmerston by the General Land Drainage & Improvement Co



J Bailey Denton
M Inst C E
Engineer to the Company

the water level within its region rises; and the water which finds its way on all sides into the valleys imperceptibly from the chalk, by overflowing the margins of the impervious alluvium forming the bed of the valley, or by oozing through the porous peat, is very considerable. It is therefore necessary to provide for this extraordinary influx of water."

It will be observed that the effect of the system of works here recommended would be to *increase the supply of water, and to originate rather than destroy water power.*

"As the saturated surface of the valley is constantly presented to the action of the sun and wind, and the peat soil is peculiarly susceptible of capillary action, the amount evaporated will be found to exceed on an average of years the proportion quoted from the porous chalk by at least one-half. The difference, therefore, whatever it be, between the evaporation from a constantly wet surface and that from a drained surface, will represent the loss by evaporation to the miller for power, and the irrigator for water; a loss which, although perhaps neither the one or the other would imagine it, in the valley of the Test amounted to 750 tons per annum from every contributing acre of land.

"But this is not the whole of the miller's loss by the present undrained condition of the valley. It is manifest that that portion of the rainfall which usually filters through a *porous* soil, and gradually finds its way out again at a lower level, in the present saturated state of the land flows directly over the surface to the sea. This loss might be in a great measure saved by rendering the surface constantly open and absorbent by drainage, and qualifying it to yield up for the use of the mills water which would otherwise never find its way into the stream. It may be fairly assumed, that from these two sources of evaporation and overflow, 12 inches of water over the whole surface of the valley are lost in every year; and as 12 inches of water covering an acre of land are equal to 43,560 cubic feet, or 1200 tons, if this quantity be multiplied by 12,163, the number of acres in the valleys, and regard be had to the extraordinary amount of fall or inclination of surface peculiar to it, 9¼ feet per mile—some estimate may be formed of the magnitude of the present total loss of motive power. To reduce evaporation, and to adapt the soil for the purposes of cultivation to the necessary depth, the ruling depth of the main outfall drains has been fixed at 5 feet, so that the subordinate drainage may lower the water table to a minimum depth of 4 feet."

Lord Palmerston has employed the General Land Drainage and Improvement Company to carry out the works of two areas, together with a small lateral area, comprising the pleasure-grounds and portions of the park at Broadlands. An accompanying plan shows the position of the outfall drains.

The principal outfall cut A, discharges into the Blackwater below the hatches at *a*, passing under the tributary stream or drain at *b*, and drains the area A.

The lateral outfall drain B, discharges into the cut A, at *c*, passing under the river Test at *d*, and drains the area B.

The outfall cut C, discharges into the tail of Nursling Mill at *e*, passing under the lower end of the principal cut A at *f*, so as to drain deeply and effectively the lands approaching the discharge of that cut, forming the area C, which would not otherwise be done.

It will probably be found that subordinate under-draining will be necessary to perfect the works in the areas A and C as has been already done in area B. By daily records of the height of water in test-holes, it has been there shown that the *standing* water level does not approach within 4 feet of the surface, though the fluctuations of height follow the rainfall with exactness; and by measurement of the discharge it is found that the saving of water from evaporation in favour of the river supply is from 50 to 90 gallons per minute during the summer season.

J. BAILEY DENTON.

3. LETTER FROM LORD PALMERSTON.

The following letter, written by Lord Palmerston, in reply to a request made to him by Mr. Bailey Denton, that his Lordship would state his opinion as to the influence of the recent drainage works, on the climate and water-supply of the Test Valley, will be ready with interest:—

MY DEAR SIR, 94, Piccadilly, 6th January, 1862.

I HAVE received your letter of to-day. The question to which it relates seems to me to be as clear and as simple as anything can be.

It is demonstrable that under-draining must render more dry the atmosphere of the lands drained, and it is equally plain that it cannot materially, if at all, diminish the supply of water to any river that flows through such lands. Undrained land is like a sponge; it is saturated with the moisture which, by capillary attraction, it draws up from below, and with the moisture which, in certain conditions, such as sea-fog, it imbibes from the atmosphere, and with the water which falls in the shape of rain or snow. The moisture thus held by this spongy upper stratum of the land is got rid of mainly by evaporation into the atmosphere in contact with such land; and the quantity of water with which that atmosphere is thus charged is in some cases very considerable, and being much greater than the air can hold in solution, it is precipitated in the shape of mist and fog, to the detriment of the health of the inhabitants of the district. The effect of sufficient under-draining is to convert four or five or six feet of the upper crust of the land from the condition of a sponge to that of dry earth. That thickness of crust no longer draws moisture from below by capillary attraction, and the water which falls upon it as rain or snow, or which is deposited upon it by sea-fogs, instead of rising into the atmosphere by slow evaporation, finds its way rapidly into the drains, and is carried off by them. The soil would, however, always by its retentive nature, keep to itself moisture enough to supply the wants of vegetable roots. The good effects then of draining upon the atmosphere of the district drained are demonstrable in theory, and anybody who, like me, has had drained a large extent of land, which before had been very wet, will have amply experienced those good effects in practice. The improvement in the atmosphere of that part of the valley of the Test, which extends from a mile above Romsey to two miles or more below it, is most striking and satisfactory, and is entirely owing to the drainage works which have been executed within those limits.

But then as to the effect of under-draining upon the supply of water to rivers: rivers are supplied with water by rivulets which flow into them, and by water which rises from springs in their beds as they flow along. The rivulets will probably be increased in volume by drainage works, because they will be made the outfall for the drainage of land on higher elevations. Then as to the water which was before contained in the four or five upper feet of the land through which the river flows: that water, instead of being evaporated into the atmosphere, is carried along the under-drain and is delivered into the river at the earliest point at which the descending level of the river will give a sufficient outfall; and supposing the depth of the drain to be five or six feet, in a river of average rapidity of current, the drained water may be discharged into the river at no very great distance from the beginning of the system of drains. Then as to the feeding springs which rise up in the bed of rivers, the only water that is withdrawn from them is that which would have been contained in the four or five feet of the upper surface of adjoining lands; and I have already shown that, as regards such water, the river is a gainer, and not a loser, by the drainage. All the water in the soil below four or five feet from the upper surface of the land will, as before, find its way in springs to the bed of the river, without being in any way diverted from its course by the drainage of the upper surface.

That this has been the case with the Test I can assert by experience, for the volume of its waters has not been in the slightest degree affected by the drainage works in adjoining lands. It has so happened that the river has been much fuller of water during the last two years than it had been for several years before, but that was owing to causes quite unconnected with the drainage works.

My dear sir, yours faithfully,

PALMERSTON.

J. B. Denton, Esq.

ISLE OF WIGHT.

THE greatest length of the island from E. to W. is nearly double its greatest width, 22½ miles to 13½. Its area is 99,746 acres, or 94 acres short of 156 square miles. The population in 1851 was 50,324, or one person to 1·9 acres, a density of population corresponding with that of the average of England generally.

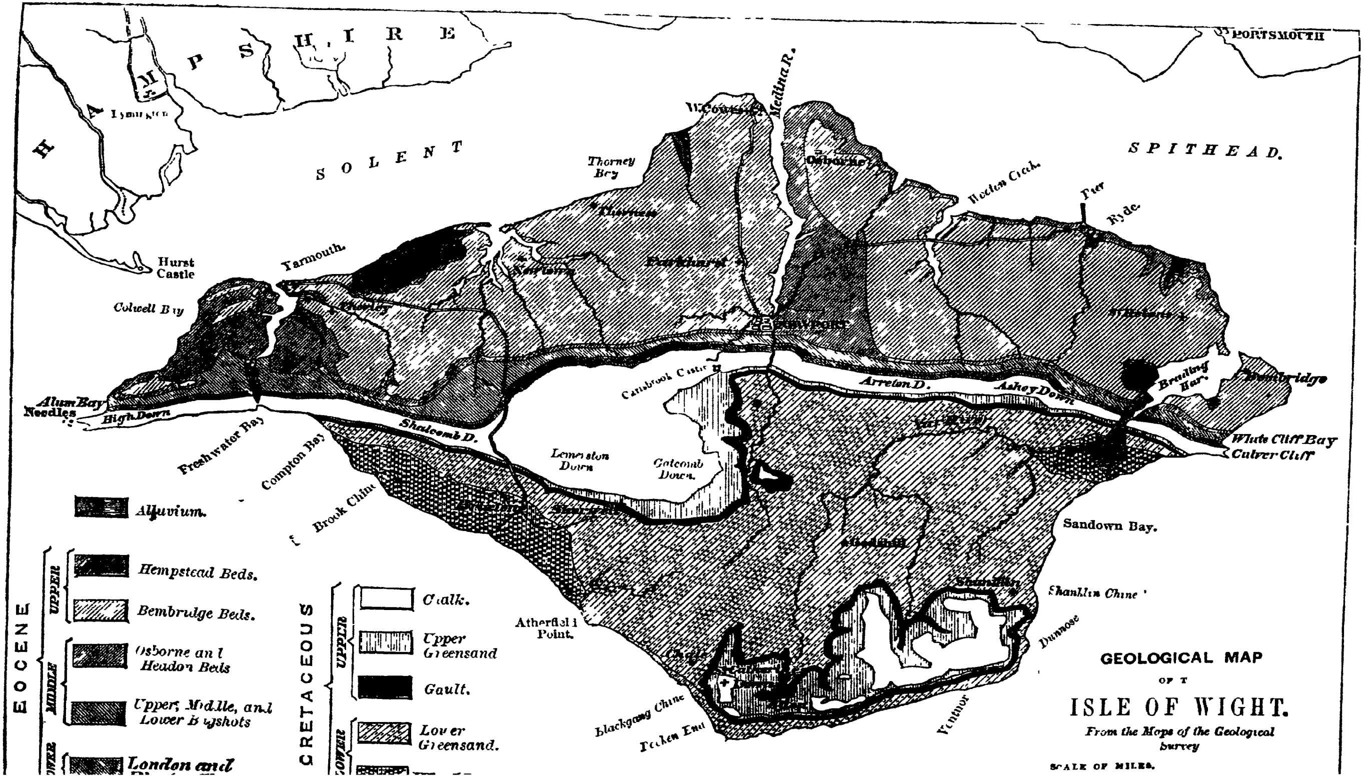
The total amount expended for the relief of the poor in the year ending Midsummer, 1860, was 11,598*l.* 18*s.*; which was thus distributed: in maintenance, 3734*l.*; out relief, 4593*l.* 17*s.*; maintenance of lunatics, 1162*l.* 10*s.*; salaries and rations of officers, 1783*l.* 15*s.*; other expenses connected with relief, 324*l.* 16*s.*

I.—"PRINCIPAL GEOLOGICAL AND PHYSICAL FEATURES."

"The fair island" is in shape somewhat rhomboidal, and may be compared to a lozenge, irregularly elongated to the west; or rather to a turbot with its head up-channel.

A range of chalk downs traverses it from E. to W., from Culver Cliff to the Needles. The line of extension is tolerably straight, except where the downs, spreading themselves to the S.W. over Ganson's, Gatcombe, Chillerton, Lemerston, and Brixton Downs, form in this part of their course a double ridge. On its approach to either extremity of the island, the chalk-range is less broad and less high. This is the principal geological and physical feature in the island. As usual with such formations, the chalk is pierced by rivers, in its centre by the Medina, and by the East Yar running through the Brading valley at that extremity. There are also other transverse valleys cutting through this central range, as at Freshwater Gate, Shalcombe, Calbourn, and Carisbrook. Another higher, but shorter range of chalk-hills, about seven miles long, extends nearly continuously from Shanklin to Chale, rising from the sea to the height, at St. Catherine's Beacon, of 775 feet. The whole of this mass of chalk has a slight southerly slope (an important agricultural feature), with a direction from E. 6° N. to W. 6° S. The two ridges converge on the east end of the island, the central ridge at Brading and Bembridge Downs trending to the S.W., the southern yet more abruptly to the N.E. The two ranges of chalk downs are, each of them, fringed by narrow beds of gault and upper greensand, the intervening slopes and valleys being composed of the lower greensand.

The weald clay appears to the S.W. in a strip about six miles



GEOLOGICAL MAP
OF THE
ISLE OF WIGHT.
From the Maps of the Geological Survey

long, and one broad at the widest point, also in two or three irregular patches round Sandown in the S.E.

The northern half of the island is occupied by plains of the Eocene formation. Belonging to the Lower Eocene is a narrow fringe (seldom appearing at the surface) of plastic and London clay, skirting the central chalk axis of the island. This is succeeded by another edging or fringe, ¼ mile broad, of the upper, middle, and lower Bagshots; thence extend to the coast the Headon, Osborne, and Bembridge series. The last is the greatest in superficial extent. All these belong to the middle Eocene. The upper Eocene is seen in the Hempstead beds near Yarmouth and at Parkhurst.

Gravel caps some of the downs of the central range, as at Freshwater, Headon-hill (where it is 60 feet thick), and St. George's Down above Arreton (where it is called "the red gravel"), and all the hills of the northern portion of the island. It is spread in an apparently continuous bed over the surface at the eastern extremity, at Foreland and St. Helen's. Between Ryde and East Cowes it is 20 or 30 feet thick, crowning the hills. It occurs also in the N.W., between West Cowes and Yarmouth, on the summit of Hempstead Hill, and in Parkhurst Forest. There are also beds of sand and gravel, with peat underneath them, in the south-western basin.

I estimate the areas of these different formations thus :—

	Sq. miles
Central chalk range	21
Southern ditto	8
Intervening greensand	45
Weald clay, S.W.	5
Ditto, S.E.	3
Bagshot	14
Osborne and Headon	10
Bembridge, N.W.	28
Ditto, N.E.	16
Hempstead	6
	156

From this, it will be seen that the Bembridge series comprises no less than 44 square miles of the northern half of the island. These are composed of an upper and lower bed of marl, which last rests on an oyster-bed, which again rests on limestone. The three upper beds are argillaceous, the lower is calcareous, and from its distribution takes local names from Binsted, Cowes, Gurnet Bay, Calbourn, Dodpits, and Sconce, being occasionally separated by shales and beds of marl.

Thus we have, in this little island, a repetition of the mainland in miniature, or rather a model, within a circumference of 56 miles, of all the formations of the Tertiary system, from the Upper Eocene to the Wealden inclusive. Scarcely one series is omitted in the representation, and, with only three exceptions, the names assigned to all the Eocene beds, are derived from places in this island.

There are five river-basins in the island, which may be worthy of simple enumeration, hardly of description, for they are necessarily insignificant in area, in the height of the watersheds which divide them, and in the volume of water which passes through them. In point of size they are not unequal, and in shape they are similar triangles, except the narrow valley of the Medina, in the upper portion of its course. They are:—

1. That to the south-east, drained by the Eastern Yar, the most fertile of all.
2. That to the north-east, forming a succession of clayey and sandy valleys, watered by the Wootton stream and many other small streams opening separately into the sea.
3. That to the north-west, of a similar character, having as an estuary the Western Yar, which here takes the place of the Wootton stream, though shorter in its course.
4. That to the south-west is traversed by many rivulets bursting forth from the higher ground at the junction between the chalk and the greensand. These tear their way through, and eat deep troughs in the retentive wealden clay, and thus form gulleys or "chines," more charming to the tourist in search of the picturesque, than to the agriculturist in search of profit.
5. That of the centre is drained by the Medina, a very narrow stream while in the chalk district, but no sooner does it reach the Eocene, than it expands from a brook you can jump over, to an estuary navigable at high tides for vessels of some burden.

In the central chalk range the chief elevations are: Bembridge Down 355 feet, Ashey 424, Carisbrook 239, Motteston 661, Node's Beacon (Freshwater Down) 483, Needles' Down 450.

In the southern chalk range: Shanklin Down 736 feet, Dunnose 771, Boniface 783, Appuldurcombe 735, Week 690, St. Catherine's 775, Chale 323.

Both ranges throw out spurs—the one to the southward, the other to the northward, at right angles to the main ranges—dividing the whole surface in every direction into woody dingles, smooth or rough coombes, winding valleys, basin-like glens, or "bottoms." Such are the depressions at right angles to the backbone of the island, between Ashey and Messley Downs, and West of Arreton Down, Calbourn bottom, and Shalcomb.

There is a distinction between the western and eastern portions of the north. In the western, one long and open valley runs westerly from Newport to Newtown. In the eastern, the valleys are short and run northerly at right angles, either to the sea or to the central chalk range. Thus the road from East Cowes to Ryde is an alternation of steep hills and deep valleys.

II. "THE NATURE OF THE SOILS AND THE CHARACTER OF THE FARMING IN THE DIFFERENT DISTRICTS OR NATURAL DIVISIONS.—ALSO IMPROVEMENTS STILL REQUIRED."

The natural divisions of the island for farming purposes are strongly marked by the geological differences which exist between north and south. The northern edge of the central chalk range is the line of demarcation, between the southern Chalk, and the northern Eocene.

I will subdivide the southern division into three parts, make a few remarks on the characteristics of each, and then some on the whole of the south. I will then pass on to the north. I will conclude with some matters which refer to the whole island rather than to any particular division of it, and some "improvements still required" here.

(I.) *The chalk range in the south* is of a different character to the free chalk in the centre: it is hard, very little influenced by frost, which merely causes it to split into flakes, and does not pulverise it; consequently it is useless as manure.

The soil here across the island, from Shanklin to Shorwell, is of four kinds:—1. The bare chalk down, with some furze on it. 2. A border of stiffish soil along the margin of the chalk. The surface of this after a severe frost so pulverises, that you would hardly think it would come together again. A little wet, however, sets it like pudding, so that a plough will hardly touch it. 3. The freestone border, a lighter soil. 4. The lower land, wetter and closer than the freestone, but not so stiff as No. 2. It is more of a clayey nature, and weather has not the same effect on it.

From Shanklin to Shorwell and southwards, the size of the farms varies from 100 acres to 500. There is very little pasture, except a meadow near the homestead for the dairy cows, and more or less down attached, according to the situation. The four-course system prevails. The lands are eight turn. Of seed-wheats old white-straw red (an island sort), Buonaparte's imperial, or Dantzic white, are the favourites. The barley is the Chevalier, old American, or Nottingham. On the best farms a portion of the wheat-stubbles (according to wants) may be put to vetches or green food of some early kind, as a catch-crop before the turnips. The turnips are fed off with the fold, and generally followed by barley, rather than by oats. When seeded to clover, 10 lbs. red, 4 lbs. hop, and a little rye-grass; or 4 lbs. white clover, 4 lbs. trefoil, and more rye-grass, are two favourite mixtures. The red clover is first cut for hay, and then fed; the white fed only. Sainfoin is grown on the down land. Farm-yard dung is applied to the clover leys, and artificials to turnips. It is said, that it remains yet to be discovered what artificial manure suits No. 2 soil. Superphosphate hardly affects it.* The soil ought to be analysed. The average produce is of wheat 20 bushels, barley 30, oats 35, swedes 15 tons, clover and sainfoin 1 ton.

The late Lord Yarborough was an agricultural benefactor to the whole of this district, much of which belonged to him, and in which his mansion of Appuldurcombe was situated. The steward of the present Lord Yarborough, too, is most highly spoken of, as ready to suggest and to promote any improvement. There is said to have been a very perceptible change for the better within the last few years. Ploughing with two horses, which is still very partially adopted, was unknown ten years' since, and turnip-cultivation has largely increased of late.

(II.) We will now advance a little further north, and take a district having within its boundary line Godshill, Pagham, Blackwater, Arreton, Hazeley, Newchurch, and Alverston, and including Rodway, Bangbourne, and Hale. This is locally called "*the Bowl of the Island*," and contains the best barley and turnip soil in it. The soils above and in "the Bowl" are: 1. Chalk on gravel, on the downs. 2. "Freestone" on the sides. 3. Red sand and brick earth loam, mixed, in the valley. Within the last twenty-five years peat used to be dug for fuel in a line from Pagham, through Merston to Blackwater, being the lowest part of the country; but it has since been drained, and the peat has for the most part disappeared The pipes used were necessarily of at least a 4-inch bore, or they got choked with "red water." Gravel so continuously caps St. George's Down, and all the downs about here, that they are called gravel, as distinguished from chalk downs. When you get over St. George's Down the soil is poorer, as, for instance, at a place called Sallons.

Farms here are of all sizes, from 50 to 500 acres, chiefly arable, with pasture as before. The 4-field system prevails: the lands are 16 turn. A few tares on perhaps one-fifth of the wheat-stubbles may be taken as a catch-crop. The white straw and golden drop are the favourite wheats; among turnips the green round is preferred, and for barley the Nottingham. There is no difference in the mode of consuming the two sorts of clover. The turnips are said to have degenerated within the last three years, and mangold are coming in. Autumn cultivation is little practised, except by such good farmers as Mr. Jacob and his son of Hazely. Some prefer to grow couch on their wheat-stubbles for the ewes to run over. But altogether the farming here is the best in the island. The produce is at least ten per cent. above that in the south.

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* I met with instances of the same kind in the neighbourhood of Petersfield, Selbourne, and Alton. Superphosphate is said to do little or no good. I would observe that this soil, both on the mainland and in the island, is on the greensand.

(III.) *In the south-west about Brook*, and thence towards Shorwell, there is a good wheat soil above the weald clay; but the district is much exposed to the south-westerly gales. The lands here are 8 turn. The clay is red, and there is a sufficient surface soil. About Kingston the soil is shallower; but it has been nearly doubled in value of late years by the use of artificial manures, and the consequent growth of turnips and increase in the number of sheep. Mr. Morris is the chief improver here. He has brought into cultivation land not originally worth 5*s*. an acre, and laid it out in fields of forty and fifty acres each. He has drained extensively chalked and sheeped his land largely. He was the first farmer who used a steam threshing-machine in the island, and now he has all the approved implements. A man of foresight, enterprise, and courage, he is spoken of as the father of agricultural improvement in the island.

(IV.) *Throughout the south*, the sheep are for the most part of the old island breed, horned, and lambing early like the Dorsets. About 50 ewes are lambed on 100 acres. Their constitutions are supposed to be hardier than those of the Hampshire Downs. When the ewes are put to Down rams, the lambs come to maturity earlier. For sending fat lambs to the London market, Good Friday is thought a lucky starting day. The ewes when done with are sold out to the lower-land farmers in the middle of the island for grazing purposes. The smaller occupiers and those off the chalk do not keep a breeding flock, but buy in, either from breeders on the island or at Weyhill and other fairs on the mainland, Bridgewater or Dorset ewes. The horned lamb is worth 2*s*. a head less than the black-faced, when they appear together in competition; but the chance of the former lies in his priority. In the spring and summer there may be one sheep to an acre; but as the lambs are fatted off, or old ewes sold, the number is reduced by one-half towards the end of September.

For dairy purposes Alderneys are kept on the best farms, but generally half-breds of some kind, such as the island cow (a sort of "Forester"), crossed slightly with Shorthorns. Captain Pelham had at Yard Farm a fine herd of Shorthorn cows; but they were not continued. For grazing purposes Devons and Shorthorns are preferred; but only the best farmers graze, and they say it pays now better than formerly. Nearly all grazing cattle are imported. Devon oxen are often worked and grazed afterwards. Cheese is made in the south—whole skim, (*Vecticè*) "Isle of Wight rock." There is a fable, that a ship being freighted with it and with mill-stones, the rats found the former the harder of the two.

Many of the present farm-houses in the south were originally manor-houses, and are in themselves very interesting. Such are the residences at Yaverland, Arreton, Merston, and Westcourt.

The farmyard is sunk in the centre, with a causeway round to get at the sheds. The buildings are substantial, though often old and ill-arranged, or without any arrangement. The freestone is near at hand for the walls; indeed it is sometimes too handy. I have seen a rick-staddle, with sides built up like a wall. "They are much firmer than them iron cap things," was the remark made to me. "Yes; but how about the rats and mice?"

In the whole of this southern district there is excellent natural "shelter," a good aspect, and a mild climate, as is clearly indicated by the fuchsias, myrtles, and gay flowers, which make the cottage gardens blossom as a rose. These advantages compensate largely for any deficiencies in the soil, and I must add in the farming: they are a marvellous set off both for stock and produce.

The manual labour is .05: the tithe is very variable. The poor-rates will be alluded to by and by. The rent of land varies from 20*s.* an acre in the south to 35*s.* in the vale of Arreton. Leases are general on the larger properties.

(V.) In the *Northern Eocene division* the farmer has to contend with those cold, wet, yellow clays, or clayey sands and gravels which belong to these tertiary strata.* The varieties of soil are

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* The following analysis of soil on Mr. A. Hughes's farm at Thorness, by Dr. Voelcker, is generally applicable to the better portion of these northern soils.—

I. *Mechanical Analysis.*

Moisture	4·08
Organic matter and water of combination	6·96
Lime	2·45
Clay	75·59
Sand	10·92
	100·00

II. *Chemical Analysis.*

Moisture	4·08
Organic matter and water of combination	6·96
Oxides of iron and alumina	14·59
Carbonate of lime	1·26
Sulphate of lime	1·19
Phosphoric acid	trace
Magnesia and alkalies	1·57
Siliceous matter	70·35
	100·00

Dr. Voelcker adds, that these unmellowed, streaky clays have naturally little or no lime. That which was found here had been applied at some time. Except lime, there is abundance of fertilizing materials, but in a locked-up state, and in a shockingly bad mechanical condition. Draining, deep autumn ploughing, winter exposure, and liming, are the remedies.

the same as on the opposite mainland. In fact, the greater part of the New Forest is but a continuation of the fluvio-marine strata of the north of the island. The same estuary formations, the same natural divisions, the same soils, border either side of the Solent.

The portion east of the Medina is on the whole the worst, including a large share of gravel and much ground naturally fit for wood and coppice only. Some alluvial soil is found in the valleys, but these are short and narrow, and the hills, capped with gravel, soon rise above them. A description of one of these tracts of alluvial valley is applicable to all of them. One of the most considerable lies on the western side of the Wootton river. Immediately on the slopes of the bank is found a deposit of rich brick-earth of a reddish-brown colour, mixed clay and sand, varying in depth from 6 feet to 25. It is partially distributed in the bottom, and soon intercepted in its progress up the side of the valley by the eocene clays which underlie the gravel which caps the hill above.

The portion west of the Medina is more open. The main valley (that from Newport to Newtown) is broader and longer. Some is under grass, but the most part arable. The soils are stiff, wet, cold, and often poor in the hollows, but become more tractable as the hill-tops are approached, and wherever there is a sufficient admixture of sand and gravel to adapt the soil to roots and barley. This land, though apt to run together, breaks again with comparative ease if skilfully exposed to atmospheric influences. Sometimes, however, the sand and gravel predominate, as about Parkhurst. There is some wet land, troublesome to manage, between West Cowes and Yarmouth. But proceeding yet further westward, about Thorley and Wellow, we meet with some good pasture and arable; on ascending the rising-ground towards Shalcomb (not so very long since a rabbit-warren), we have before us a view which this island seldom exhibits—some large and pleasant turnip-fields on the flat, with sheep folded on them. An eminent geologist, who has made this island his study, gives the explanation. We are here on the Bembridge limestone, much of which, in this spot, is a true travertine or calcareous tuff, with a peculiar brecciated appearance. Its porosity depends on the presence of irregular, confervoid, tubular cavities, so characteristic of the Bembridge limestone elsewhere, as at Sconce, and strikingly comparable with a like appearance exhibited by the travertine of the Paris basin.*

Except on lands such as these, the farms are small. The usual rotation on the wet land is: 1, wheat; 2, oats (this land is not fit for barley); 3, seeds; 4, an open summer fallow. The grass is broken up in November, and in the following spring and summer the land is dragged down, cross-ploughed, dragged again, ploughed up into ridges, dragged, and sown to wheat broadcast. There is only one ploughing for oats in February. The lands are curiously small, only four turns. Autumn cultivation is not practised, the wheat-stubbles being left untouched till seed-time. The oats are broadcasted, and the seeds harrowed in at the same time. Instances are not wanting in which the land is not seeded, but left to itself for years after two crops of grain. It is rather deserted by the plough than converted into pasturage. The plough is always drawn by four horses. The dung is applied to the wheat-crop, with sometimes a little guano as a top-dressing in the spring, when the wet seems to tell on the young plant, and a stimulant is wanted. A few lambs are bought in, and sold out as tegs. The expense of this system is fearful to contemplate. The cost of the three ploughings and three draggings, with four or six horses, will amount to 12*s.* or 14*s.* per acre each time. Much dung is required: but where is it to come from? There can be no grazing without roots. When, on the other side of the account, the produce is given—wheat 14 bushels and oats 20—it is inconceivable how arable farming can exist as a calling on the wet lands of the north. The old style of farming is indeed disappearing, and would be even now a thing of the past, but for the good sale for milk afforded by the watering-places, and the very little labour which the grass-fields and a few cows require. The system, even with these aids, must soon come to an end; for the soil is not naturally rich enough to allow all its produce to be carried off, and nothing but the cow-droppings restored to it. On the drier soils, barley (for which three or four ploughings are given to get a fine tilth) is substituted for oats; or, on favourable spots, turnips follow wheat, to be themselves followed by a fallow on the less generous, by barley on the better ground.

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* Professor Forbes on 'The Tertiary Fluvio-Marine Formations of the Isle of Wight.'

The cautious native agriculturist is not disposed to trust any of the soils, whether more or less dry, farther than he can see them. He is fearful of their ingratitude if he treat them too well. "The land is weak," he says; "if you force it too much, it will give out altogether.'

The better farmers throughout the north buy in Dorset ewes at Appleshaw or Weyhill in October, at prices varying from 36*s.* to 48*s.*; keep them at first on stubbles and clover-leys; put them on turnips in November or December, when they lamb; force on the lambs with white peas and cake; begin to draft lambs from New Year's Day, the trade continuing steady through

February and March, at 36*s.* or 44*s.* When the lambs are gone, the mothers are fatted on vetches or layers, with ½ lb. of oilcake each, and sold in September for about 45*s.*, the wool being worth 6*s.* 8*d.* more. These are not bad agricultural returns.

The buildings throughout the North are very inferior to those in the South. They are of stone (if convenient), or brick (if more convenient), or mud (which is most convenient), with frames of wood and roofs of thatch. There are, however, some good premises at Swainston and Thorley. The late Sir Richard Simeon was the first to apply the stalling system to sheep, and it is continued at Swainston to this day, almost a solitary instance of such perseverance. I saw both sheep and beasts tied up on boarded grating.

The manual labour is ·05, the tithe is 3*s.* or 4*s.* an acre, the rent 1*l.* on the best-managed and improved farms, and 10*s.* on those of inferior quality in the hands of tenants of the old school. Leases are not usual except on the larger and better farms.

Is it too much to say that the north of the island is, as a whole, a century behindhand in practical agriculture? One would suppose things could not go on as they are, if they had not gone on so long already. With an open fallow, with 14 bushels of wheat per acre, with no roots and little stock, the present system would seem, in these days of competition, doomed, in spite of the milk-pail. I heard the mass of the tenants spoken of, as deficient in intelligence, capital, and enterprise. I have no doubt of the fact. But are the landlords as a body prepared to do their part? I am not going to enter into any vexed questions of the relations between landlords and tenants; but any occupier who sinks his capital in these undrained cold clays, by attempting improved modern systems of farming, without the proper preliminary improvements both in the field and yard, must be a very bold man. The change has already begun both among landlords and tenants. Much of the land has been, and is, in the market. The purchasers have in some cases become residents, and have entered on the improvement of their newly acquired property, with the zeal proverbially attending on the prosecution of a new pursuit. In other cases, tenants from over the sea, with a scientific education, practical experience, and new ideas, have been introduced. The ownership of the land, and its management, are both in a transition state.

Any report of the farming of the northern portion of the island would be incomplete without a description of the Prince Consort's farm at Barton—not because it is the Prince's, but because it is the farm which any unprejudiced person would select as "the characteristic farm" of that district, and as exhibiting features to which all good husbandry here will, sooner or later, conform. His Royal Highness is now in advance, of his neighbours; but he is not now so much in advance as he once was; and the time will come—and this will be the best proof of the practical character of his system—when he will be no longer in advance, but when all will move forward in the same front rank.

This farm—which is to be considered, not so much a model, as a scene for experiments, which others may see, and, if they like, imitate—comprises a little over 800 acres, of which one half is arable, the other half pasture (chiefly park). It has been in his Royal Highness's occupation sixteen years. The soil is no better than that of the neighbourhood, and has already been described. Yellow clay and clay gravel are the subsoil; the same materials, improved by cultivation and exposure to the atmosphere, compose the surface soil. On the high grounds the soil is generally lighter; on the low grounds it is yet more clayey and stiff. The first operations were thorough underground draining (4 feet deep, and from 18 to 40 feet apart, according to the subsoil), throwing the fields together (they are now from 15 to 20 acres each), and the construction of the buildings. These last were built in the year 1852, and are not now so novel in their excellence as they once were. They consist of two blocks, with the roadway between them. One block measures 140 feet by 100 feet; the other is a square of 100 feet, with a straw house appended 15 feet long and proportionately broad. On your right, as you enter, is the largest, and, as it may be called, the breeding block. It consists of a yard for the young and dairy stock, surrounded on two sides by a lambing shed, piggeries, sheep, and pig yards (adjoining the shed and pigstyes), artificial manure shed, breeding sows', and bull houses. On the third side are the cow and calves' houses. The dairy cows are tied two and two in a stall, stand on brick, and are cleaned out daily. There are also two large boxes for cows about to calve, and adjoining is a provision store for the dairy stock. Opposite the dairy cows are sunk boxes for feeding cattle, and boarded grating for sheep feeding. No sheep were there at the time of my visit, in the winter. In this climate you do not want to house sheep, and on this soil you do want the manure in the fold. Along the whole of this third side, between the cows and the fatting stalls, runs the tramway, across the road, into the opposite and the smaller block, which may be called the grazing block. Here are to be seen twenty-four fatting boxes for bullocks, occupying one side of the quadrangle, and communicating with root, chaff, and oilcake stores. The food is all cut and prepared by the steam-engine (fixed on the side adjoining, at right angles) which of course drives the threshing-machine; the barn completes this side of the quadrangle. The third side is occupied with boiler and well, carpenter's shop, and cattle shed. The yard in this block is used for the store beasts, in preparation for the boxes. Here also, against the road, is the liquid manure tank, into which everything drains. In the rear of these two blocks, are the stables, a provision store 100 feet long, and a cart shed, with a granary over of the same length. Two implement sheds, each 90 feet long, complete the farm buildings, of which it may be said that they are sufficient, commodious, and thoroughly practical. The walls are brick covered with slate. The granary is on brick arches with iron girders, and having the floor covered with patent cement as a protection against vermin. The engine is 8 horse power, by Easton and Amos, and does a variety of slavish work—threshing and cleaning corn, cutting chaff and roots, crushing oilcake, splitting beans and peas, bruising oats, grinding corn and tools, turning the saw-mill for the carpenter, and pumping water for the fountains at Osborne. The whole of the stock on the farm is supplied by water from a spring on a higher level than the buildings.

Since the land has been drained (and, but for the draining, no root-crops could be grown on a good deal of the farm) the customary open fallow has been abandoned for the four-course system. The farmyard manure is chiefly used on the clover leys preparatory to the wheat crop; but the crops of beans, peas, and mangold have their share. The quantity varies, according to the nature and state of the land, from 10 to 20 tons an acre. The frequent ploughings, and the continual cleaning of the root crops, keep the land, as I can testify, very free from weeds. I saw no couch, only a little water-grass in spots. The wheat stubbles are ploughed with four horses 8 inches deep. The other ploughings are with two horses, 5 inches deep; and the work seemed to me to be executed with ease and celerity. No scarifier is used. The harrowing is done by appending four harrows to a pole, covering a 14½ feet land, drawn by four horses, two at each end, in line, walking in the furrows on either side of the land. Thus is treading avoided—the great desideratum of every farmer in this heavy country. The wheat is broadcasted, two bushels per acre, and not hoed, hoeing being the protection against *annual* weeds, of which there are few here. In the Island generally wheat is mown; here Burgess and Key's reaper, with a side delivery, is used. Of the turnips three fourths are consumed in the fold; one fourth (together with all the mangold) is hauled home. They are drilled in with 3 or 4 cwt. of superphosphate and compost. The mangold have in addition a farmyard dressing, that root availing itself of any amount of manure, whilst the land requires more since the crop is all drawn off. Guano is applied as a top dressing, if the wheat or the oats want it in spots, or when wheat follows beans. Chalking is in favour, 30 tons per acre. The chalk is procured from Portsdown Hill, delivered at Barton Hard, close by, for 2*s.* 9*d.* per ton. This chalk is considered quite equal to that of Arreton, and one-third cheaper. Much stable and other dung, at 6*s.* 6*d.* per 1½ tons, comes across the water, and is considered the cheapest manure procurable.

The return of live stock 1st July, 1860, is as follows:—

Horses	20
Colts and foals	11
Cows in milk	10
Other cattle	54
Rams	4
Ewes	422
Lambs	246
Other sheep*	111
Swine	51
	929

The horses are chiefly Clydesdales. For mere cultivation ten only would be sufficient, now that there is a steam-cultivator (Smith's). The rest of the horses are used for other than farm purposes on the estate. The milking cows are Alderneys; the grazing beasts are polled Galloways. The cow calves are kept for stock; the bull calves got rid of immediately. The sheep are chiefly South Downs, with a few Dorset ewes for early lambs. The Down lambs are kept for stock, or fatted off as tegs. The horned lambs are fatted off at once with cake. The pigs, of the Sussex breed, improved by Fisher Hobbs' boar, are killed as porkers. No food is cooked for them, nor for anything else. As to implements, there are some of all sorts, His Royal Highness thinking most things worth a trial. On one point he has come to a very decided opinion. There is not a waggon on the premises, but a double set of cart beds, harvest beds and dung beds, which are placed, as occasion demands, on the same axles and wheels. When not in use, the harvest-beds are stowed away like plates in a plate-rack.

The following table will give the land under cultivation, distinguishing crops, on 1st July, 1860, and the quantities produced (which are extraordinary for last season) as ascertained afterwards:

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* Among these are no longer to be reckoned the Puriah sheep of Thibet. These were first described by the late Mr. Moorcroft. One ram and three ewes arrived at Osborne, March, 1849. They increased in a year and two months to 15, the ewes lambing twice in the year, but out of 11 lambs there was not one male. On inquiring for them, I learnt that, after a time, the climate had disagreed with them, that none now survived, and that the last were sent to the Zoological Gardens.

	A.	R.	P.	Produce per Acre.
Wheat	95	0	0	36 bushels.
Barley	48	0	0	44 "
Oats	48	2	0	48 "
Beans and peas	20	2	0	28 "
Vetches	18	0	0	
Turnips	77	2	0	
Mangold	22	0	0	
Clover and trifolium	61	0	0	
Potatoes and carrots	5	0	0	
Permanent pasture	412	0	0	
Waste and roads	13	0	0	
	820	2	0	

It only remains to add that these farming operations are meant to pay, and do pay. Weekly, monthly, quarterly, and yearly accounts are kept in the most business like manner, and regularly forwarded for His Royal Highness's inspection. There is an independent audit; and, if there be any reliance on figures, both ends are made to meet, and more than meet.

There is another and a more recent agricultural improver in this same north eastern division of the island, whose spirited efforts must not be passed over in silence. George Young, Esq., purchased, four years since, 730 acres of land at Ashey, of which, in its present state, 500 are arable, 90 down, 30 coppice, 78 pasture, and 32 recently reclaimed. It was, at the time of the purchase, a wilderness of trees, bushes, and crooked fences, under water, and without roads, almost in a state of nature. All but the coppice is drained, under the superintendence of Mr. Parkes, 4 feet deep, 30 and 27 feet apart, or closer where the clay was particularly retentive. Mr. Young has grubbed 150 acres of oak coppice, and has put, or is putting, it under cultivation. He has made roads, straightened the fences, and thrown his fields together for the steam-plough, having had Smith's at work for nearly the last two years when the state of the land permitted. He has chalked and limed some portion with 40 tons of chalk per acre and 2½ of lime. When the heavy work of his other improvements is over, he will go on with this, having chalk, and lime kilns on the farm. He made his own bricks and pipes of the clay on the property, erected sawing machinery, and himself superintended the erection of the whole. The homestead is well arranged to save labour. There are stalls and boxes for eighty cattle, a shed 84 feet long and 14 wide for feeding sheep on boards, besides every other possible accommodation. The feeding troughs are of brick and cement, and water can be turned on from a supply on higher ground. There is a boiler for steaming food both for cattle and pigs, in which rapecake is boiled, and strewed over cut straw, hay, and roots. A peculiar kind of truck on three wheels is used, which, when filled with 12 bushels of cut turnips, a boy of twelve or fourteen can wheel with ease, turning the corners without difficulty. There is a 10-horse portable engine by Clayton and Shuttleworth, who also put up the barn machinery.

Besides this homestead, Mr. Young is erecting another on the same farm, but nearer Ryde, for a dairy of fifty-six cows, to be extended to ninety-two, if found to answer. Italian rye-grass will be grown, and watered with the liquid. There will be a fixed 4-horse engine for cutting roots, churning, &c., and the waste steam will be employed to cook the food.

No regular system of cropping can be as yet adopted, but the four course is contemplated. A crop of oats is taken the first year after the land is reclaimed, then mangold or swedes, to be followed by wheat and clover. A portion, on being cleared, was pared and burnt, and swedes taken as a first crop, followed by oats. Liberal applications of farmyard and artificial manures are made. Last year 14 tons of guano, and 20 tons of Lawes's superphosphate, were used, besides all the dung made at home, and what the town of Ryde could supply. Within the last three years 1900 tons of dung have been bought, in Ryde, and its neighbourhood.

The sheep stock is about 700, 360 of which are breeding ewes, which Mr. Young hopes to increase next year to 500. They are Hampshire downs. There are 25 shorthorn cows, 32 grazing beasts (Devons and shorthorns), besides 4 store calves, and 8 working oxen, which are found very useful for rough, heavy work. Next year it is contemplated to grow 120 acres of roots, and to tie up 70 or 80 grazing beasts. Ten horses (Clydesdale and Suffolk) are kept for farm purposes, besides 7 colts. Pigs (Berkshire and Sussex), 78.

The following is the return of land under cultivation last year, together with the produce:—

	Acres.	Produce per Acre.
Wheat	86	from 16 to 32 bushels.
Barley	30	„ 34 „
Oats	95	„ 48 „
Beans	14	„ 24 „
Mangold	45	„ 18 tons.
Swedes and turnips	85	„ 16 „
Clover	75	„ 1¾ „

This, be it remembered, is the produce both of corn and roots in the last bad season, and greatly under that of the two previous years. The mangold were only half a crop.

It is too early days yet to speak of successful results. But endeavours after success, such as these, deserve all honourable mention, and the hearty good wishes of the entire community, whether consumers or producers.

The late Sir Richard Simeon, in the north-western division, was a most enlightened benefactor to his neighbours and to the whole of the north of the island. Animated by a generous public spirit, he made experiments, probably most costly to himself, certainly most instructive to those who had the wisdom to profit by them. To no proprietor do the agriculturists of this island owe a deeper debt of gratitude. He drained at various depths—2½, 3½, and 4 feet—and found the deepest drains draw best even in the stiffest clays. He next introduced an improved rotation on the Swainston estate: 1, turnips; 2, green crop; 3, wheat; 4, seeds; 5, oats or beans, with a winter fallow. The turnips are, part of them, hauled home, the rest just unrooted with the picker, to prevent their drawing the land, and consumed by sheep. Spring tares, or some green crop, follow, and being folded off, the land is left in good heart for wheat. The seeds are rolled in at spring. The superiority of this system is evident. There is a break between the two white straw crops; there is no expensive open fallow; and, the land being in good heart through the sheep, less farmyard-dung is required. The expense is one quarter less, and the produce half as much again. And yet the example does not spread among the old residents; there is hardly a farm now so managed off the Swainston property.

The "characteristic" farmers hitherto mentioned are their own landlords; but there some good tenant farmers in the north-west: such are Mr. Barrington, of Thorley, who has brought with him from Devonshire, two herds of Devons, dairy cows and steers; Messrs. Shepherd, of New Barn; and Mr. Cheverton, of Shalfleet; but for an improving farmer, where improvement is most wanted on indifferent land, general reputation points to Mr. Alfred Hughes, of Thorness. His used to be one of the most neglected and despised farms in the Island; it was actually let, four years since, at 7*s.* per acre, and, in its unimproved state, with its poor buildings, was not cheap at that rate. The then occupier of 460 acres fared and lived like a labourer. It has since been drained, partly by the tenant, and buildings have been erected, of which a candid critic would say, that their imposing appearance is at least equal to their practical utility.

The characteristic of Mr. Hughes's management may be said to be, the skill with which he rapidly slips into the ordinary four course rotation, by means of stolen crops. Climate helps him much, but not more than his neighbours, whereas his soil is rather worse than theirs. He brings the poor higher lying land into good cultivation by following his corn crops with green crops, such as Italian rye grass and trifolium. The former is hoed into the wheat at the last hoeing in the spring, the trifolium scratched into the wheat-stubbles. Both are forced with artificial manures, and yield heavy summer night and day foldings, with cake or corn. They are hard food, never scouring the lambs, and form a substitute in this district for the sainfoin of the chalk country. The fold is immediately followed by the cultivator, and turnips put in at once. Here is a significant entry in Mr. Hughes's farm-book: "July 5. Broke up Northfield with Coleman; harrowed, rolled, and burnt the rubbish; drilled purple-puddings the *same afternoon.*" And so on, from day to day, as fast as the land was cleared; the work was begun and finished *within the day*, up to August 15th. Some of the earliest sown of these purple puddings I saw on the ground in November. The crop, not less than 30 tons, was too great to be consumed on the spot —on one half the sheep were folded, the other half was being hauled to the barley stubble, where the breeding ewes would be folded at night, and manure the ground for peas. So that 1 acre of the turnip crop manures 2 acres of land—one where the crop is, another elsewhere. The young turnip-plant will want cutting out at a very busy time, in the middle of harvest, some one will say. Mr. Hughes has met that difficulty, as Mr. Pusey suggested in the Society's Journal some years since. One fine summer morning he and his carpenter (no one else could be spared) got up early, and put Garrett's horse hoe through the ranks. Mr. Pusey had given no very specific directions, and the Thorness imitators made a natural mistake at starting. They put the *heels* of the knives towards the plants to be left. This was found to cover them with mould, and was soon corrected by boldly turning towards them the points. In addition to the fine tillage thus produced, the work was so accurately regular, that, as the labourers expressed it, the field was like panes of glass. Mr. Hughes covers his roots that are to be first consumed in the furrow with the plough, as Mr. Boxall does, though he does not turn so much earth over them, in consequence of the greater mildness of the climate.

The naturally strong, but misused, and so worn and washed out, clays in the valleys, Mr. Hughes improves by laying them down to broad clover and a mixture of grasses, for two or three years, assisting these with artificial manures, cutting one crop and feeding another.

The root land comes into barley; or, if too strong for barley, then into beans or oats, which are grown on the lower grounds. Barley is preferred for the higher, and is there found of good malting quality. One shallow ploughing of the clover ley is sufficient for wheat, which should be all in before November. The half rod lands are just covered, and can be well worked, by drills, cultivators, harrows, and horse-hoes, the horses walking in the deep furrows.

For most of the ploughing two horses (Suffolks) are sufficient, though three may be used when turning in a stubble for roots. About ten Irish shorthorns are fatted during the winter. Mr. Hughes follows the usual Isle of Wight plan of breeding early lambs from about 200 Dorset ewes. The lambs are all gone by the end of May, and the ewes (also fat) in October, to make room for their successors. The beasts will probably be diminished, and the flock increased.

Mr. Hughes always keeps the chalk cart at work. He has greatly improved some salt-marshes, at a small expense, by a low bank of earth, and some hatches for the management of the sea water, and by fresh water irrigation from the higher ground. Some extensive tracts, between Newtown and the sea, seem very capable of receiving similar benefit from similar treatment.

(VI.) *Observations on the whole Island.* - The best *chalk* in the island comes from Arreton Down: the cost at the pit is 1*s.* 3*d.* per waggon load, and it is hauled to a distance of six miles. It is applied, as elsewhere, to the wheat stubbles, at the rate of 15 or 20 tons to the acre, and allowed to lie before being ploughed in. The effects are described with enthusiasm. The straw is stiffer, the yield of corn greater, and its quality higher: in the turnips, clubbing disappears, and ten good roots are grown in the place of one.

The *horses* on the Island are a good sort of animals, short and punchy, with a hardy constitution, but of no particular breed.

Four horses are said to be indispensable for winter and spring *ploughing*: "two have been tried, and ruined." But then it should be mentioned how horses are kept on the Island. During the winter they have no hay, nothing but barley straw: their allowance when at hard work is one bushel of oats per week; vigour and endurance are hardly to be looked for on such keep. The heavy island plough also must be taken into account.

The old Isle of Wight plough is the high carriage *implement*, in its pristine freedom from modern innovation. I have heard that it had, at no remote period, wooden wheels. I did not indeed see a specimen, there seemed to be some shyness in exhibiting them to a stranger: and yet this implement has improved. The share is now not of wrought, but of cast iron—a change which I heard a ploughman regret. "You can't ply the point down, if he turn up a bit." Howard's ploughs are coming into use, being one-fourth lighter. Scotch carts have been tried; but, in this up and down country, they have been found to bear heavily on the horses' backs, and have, after a trial of three or four years' together, been given up for waggons. The drill is not universally used: "I lost a crop of turnips by waiting for it once," said a farmer to me.

Newport is the *market* for the whole island: every Saturday for corn and store animals, every alternate Wednesday for fat stock. The Whitsuntide fair there has become a mere toy fair.

The *labourer* throughout the island is well paid, and not overworked. The ordinary labourer has 11s. a-week; carter and shepherd 1*s*. more, with fuel found: 6*l*. is given for the harvest month, or the wages are continued at that rate, if the harvest last longer. Generally 3*d*. an hour is paid for all overtime. Throughout the year the labourer earns 15*s*. per week, 1*s*. 6*d*. more than he has on the mainland. The ploughman in the Island takes out his team at seven o'clock in the morning, and hitches off at one in the afternoon: on the mainland he is two hours more in the field. And yet, though the Island pay is higher, and the work less, it would be a mistake, as far as my observation goes, to say the labourer there is the better servant.

There used to be a practice, almost universal, of boarding and lodging the unmarried workmen in the farmer's residence. I saw, with pleasure, this winter, in a fine old manor house, the master, his family, and his young men, dining, with certain distinctions indeed as to the position of their tables, but in the same hall and at the same time. It seemed like a revival of the good old times; but it was really here a continuance of them, the practice had never been intermitted. No doubt to it was owing much of that personal attachment between master and man, of that deference and respect to superiors, of good morals and manners, the loss of which is justly regretted by those whose memories linger in the past. Modern habits of society are, however, unhappily incompatible with this beneficial intercourse, and the practice is dying out.*

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* The introduction of the "privy parlor," or speaking room, in the end of the fourteenth century, effected the same change in the manners of the higher ranks of society. To this retreat the baron would retire, indulge in some of the comforts of a home, and avoid the noisy publicity of the common hall; where his ancestors had, for generations, presided at the dais with their retainers lining the walls on both sides. This innovation on ancient usage did not pass unrebuked by the moralists, and rulers of the day. Piers Ploughman denounces the growing practice, as effeminate and luxurious. The wise and benevolent Bishop Grosteste advised all masters that they "ete in the halle afore youre meyn," for their honour and worship's sake. Royal ordinances required that "settynge in the halle be kept after the old custome," and denounced "sondrie nobilmen, gentlemen, and others who doe much delighte and use to dine in corners and secret places, not repairing to the high chamber."—('Our English Home,' Messrs. Parker.) This good advice availed nothing. The domestic privacy of the parlour has proved too seductive, in the halls, both of the baron and the farmer.

(VII.) Among "*the improvements still required*," should be named the formation of an agricultural society for the Island. There was one, in which the late Lord Yarborough, the late Sir Richard Simeon, and the late Rev. Walton White, took a great interest. The late John Fleming, Esq., gave annually 50*l.* for distribution among servants. It flourished for a few years, and then ceased, for no reasons connected with the interests of agriculture. It is a pity that it should not be revived: the good feelings of the farmers would not be wanting. No race of men are more hospitable, more good-hearted, than the farmers of this island. I speak in the recollection of their kindness. All of them know each other from meeting at their single market: many are blood relations. A farmers' dinner is a family party.*

Whatever may be the result of a general comparison between the agriculture of the mainland and the Island, the latter can at least claim priority in the application of steam power to the cultivation of the soil. The Prince Consort and Mr. Young have adopted Mr. Smith of Woolston's system, which in both cases is well spoken of. Mr. Toward (Her Majesty's bailiff) considers the cultivator invaluable for autumn work on the corn stubbles, and for spring work in preparation for root crops. He twice stirs the land deeply for the last, at a cost of 12*s.* 6*d.* per acre for the two operations, which no horses could have effected at double or treble the expence. The wire rope wears well, the only breakage being near the end, where the rope comes in contact with the implement, and the remedy (shortening a few feet) being easy. Mr. Toward intends getting Messrs. Howards' new steam plough for use, when he wishes to bring more new soil to the surface. Mr. Young's testimony is equally favourable. He has used Mr. Smith's cultivator largely in breaking up land, recently converted from coppice to arable, as well as in autumn and spring cultivation. He reckons the cost of the two operations at 13*s.* 6*d.*, and also intends, when all hedges are removed and the fields squared, to attach a plough to his engine.

The compactness of this little island has enabled it to anticipate its greater neighbour in two very important branches of parochial administration, the relief of the poor and the management of the highways.

In the year 1770 the parishes were formed into what we should call a union: the rates were consolidated into a common fund, the management was lodged in the hands of 24 directors and

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* Since this was written, a Society has been formed under most favourable auspices. The objects are, better breeding and fat stock, and the encouragement of the agricultural labourer, by rewarding skill and industry in ploughing and manual labour. The breeding stock show is held in the summer, the ploughing match in the autumn, and the fat stock show in the winter.

36 acting guardians, making a board of 60 persons, and a union workhouse ("house of industry") built. The system has two serious defects, incidental to a first attempt, but admitting of easy remedies. The board is practically self-elected, and the assessment has never been altered since the year 1771. This last grievance gives rise to loud and just complaint. Parishes pay in the same proportion now as they did ninety years since; but meanwhile the changes in the value of property in different parishes have been enormous. The parish of Newchurch, for instance, running from sea to sea, has the new town of Ryde at one end of it and the new town of Ventnor at the other. The proportion of its payments to the common fund is the same as before this vast accession of rateable property. No wonder if agricultural parishes, whose rateable property has very slightly, if at all increased, call for a new assessment, with a view to a more equal distribution of the burden. As yet they call in vain.

Though we, in England and Wales, have followed the Isle of Wight example in the relief of their poor, we have not yet (though the legislature has made many attempts) succeeded in bringing, as they have done, our highways under some system of united management. The local Act (53 Geo. III., c. 92,) states, in its preamble, that "the public roads in the Isle of Wight are in many parts in a very bad condition, narrow and incommodious, and in some places dangerous to travellers; and that they cannot be widened and repaired by the laws then in being," *i. e.* by the old Highway Act of 13 of Geo. III., c. 78, and by parochial surveyors acting under it. The new Act consolidated the parishes and lodged the management in the hands of Commissioners, who are self elected. The island is divided into two districts—the East Medine and the West Medine—a general surveyor being appointed to each, with parochial surveyors to collect the rates, and pay the labourers.

Under the chairmanship of the Hon. Dudley Pelham, the Commissioners themselves repaired the roads at an annual cost of 3500*l.* This system continued up to 1851, and the roads were in excellent order: then, however, the repairs were let by tender, and the contract prices for both districts were 2530*l.*, or nearly 1000*l.* less than the Commissioners had expended. In 1858 the contract system broke down in the West Medine district, and the Commissioners have been obliged again to take those roads in hand, and to incur heavy expenses, amounting to no less than 2000*l.* in one year. Meanwhile, in the eastern district the contract system still prevails, though there are doubts whether the roads can be thoroughly repaired at the contract prices, after the materials of 1851 are exhausted. A uniform rate of 6*d.* in the pound realizes rather more than 3000*l.*: the tolls, which are moderate, produce 2400*l.* The costs of the roads, bridges, toll houses, and all expenses, except the salaries of the clerk and surveyors, amount to 4000*l.* About 500*l.* per annum is spent by the Commissioners in improvements. The extent of the roads and bye-roads is 400 miles, so that the average cost of repairs is 10*l.* a mile; but that of the main roads, if taken separately, will be found to amount to 20*l.* a mile.

February, 1861.

XVI.—*On "Pedigree" in Wheat as a Means of Increasing the Crop.* By FREDERIC F. HALLETT.

THE object of this Essay is to show that the wheat-plant from its nature requires *a mode of culture which permits its perfect growth*, and that when it is so cultivated by the repeated selection of the seed, of which, as in breeding animals, the record is a pedigree, we can gradually increase the contents of the ears without in the slightest degree diminishing their number.

In considering the possibility of effecting a material increase in our wheat-crop, very little reflection will convince us that this can only be obtained by a further development of the *contents*, not of the *number* of the ears.

The general experience that large ears are the result of a thin crop, seems to have produced the impression that the existence of such ears is confined to such crops.* This tacit assumption, that improvements in the size of the ears can be obtained only at a sacrifice of their number, has been a great stumbling-block in the way of advancement, as it closes the only path in which we can proceed with any prospect of success; that it has, nevertheless, no foundation in reality, I hope to be able to prove in the course of these pages.

In pursuance of this object we will consider the nature of the plant, in order to arrive at the natural mode of cultivating it, the effect produced upon it by repeated selection of the seed, and the practical results obtainable by this combination.

First then, as to the nature of the plant, or the mode in which it will grow when perfectly unrestrained, and *the manner in which we should proceed to cultivate it, were it altogether a new species.*

A perfect plant of wheat consists of three principal parts, viz., the roots, the stems, and the ears. When a grain is planted under the most favourable circumstances these are produced as follows:—Shortly after the plant appears above ground, it commences to throw out new and distinct stems, upon the first appearance of each of which a corresponding root-bud is developed for its support, and while the new stems "tiller" out flat over the surface, their respective roots assume a corresponding development beneath it. This process will continue until the season arrives for the stems to assume an upright growth, when tillering ceases, and the whole vital power of the plant is concentrated upon the production of the ears. These will be the finest it is capable of producing, unless the growth of its roots have been in any way interfered with, as by having been cramped or crowded by those of other plants, when the size of the ears will be proportionately diminished. I wish to avoid scientific terms as much as possible, but as a convenient mode of expression I shall henceforth speak of the "tillering" process accompanied by the corresponding growth of the roots as the "horizontal," and of the comparative length and contents of the ears produced as the "vertical" development or growth of the plant. I shall also, for like reason, designate as the "natural" mode of cultivating wheat that which gives free play to its nature.

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* The thin crop arises from the thinning of the plant having taken place at a time which admitted of only a partial subsequent development of the tillering powers of the survivors.

The extent to which horizontal development may take place is seen in the fact that the stems produced from a single grain having perfect freedom of growth will, in the spring, while lying flat upon the surface, extend over a circle 3 feet in diameter, producing at harvest from 50 to 60 ears.

That vertical development is dependent upon the horizontal growth being unimpeded, has been abundantly shown to me in the observations I have made upon the growth of wheat under different conditions. It is generally illustrated in the experience before alluded to, that a thinned crop produces fine ears; and a more particular illustration of this principle will be presently seen in the case of the original ears with which I commenced. These had been grown in the usual way in a field seeded with two bushels per acre, but by simply planting their grains separately, so as to admit of the full horizontal growth of the plants, the vertical development was in the following harvest nearly doubled.

This fact is pregnant with practical inferences bearing upon the present mode of culture, which, by the use of superfluous seed, crowds the plants and produces ears of only one-half the *natural* size.

Having thus illustrated the nature of the wheat-plant under a system of cultivation which permits its perfect growth, let us proceed to inquire how we may improve it by the repeated selection of the seed.

It has for the past twelve years been my conviction that a good pedigree is as valuable in plants as in animals, and that in the careful rearing of seed which has this qualification lies our only means of materially increasing the produce of the cereals. Amongst animals, whether horses, cattle, sheep, or pigs, the importance of "pedigree" is fully recognized, as also even in reference to some of our agricultural *plants;* for if a farmer wants a good cabbage, mangold, turnip, or carrot, he selects the seed from a good *parent*, but the moment he deals with the cereals he almost ignores the great principle of like producing like, which he admits, in the foregoing cases, to be not only a right one, but so important as to deserve much attention, and repay much outlay. Yet the minutest characteristics of a plant of wheat will be reproduced in its descendants; so much so, that we can not only perpetuate the advantages presented to us in an individual ear, but, by the accumulation of selection, make further advances in any desired direction; the union of good qualities imparting a cumulative force, and their successive renewals and establishment conferring, as in animals, a "fixity of type." To me it has always appeared that, while offering an earnest of what a better system would effect, the mode in which the best varieties of our cereals have been raised (that of starting with *accidentally* fine ears, and simply keeping the produce unmixed without any *further* selection), is a very imperfect one, and that its attainments are perhaps of less value than the earnest which it offers of future success under a more complete system: for such beginning (and *ending*, so far as selection is concerned) with an accidentally fine ear, is a very different thing from starting annually with one of a known lineage. Look at the almost parallel case of two heifers, identical in every respect but that of "pedigree;" the one what she is by accident, the other by design; the one worth 25*l.*, the other 300*l.*; from the one you may obtain any imaginable kind of progeny, from the other only *a good kind.*

The formation of a race of high-bred cereals, in many respects, admits of more rapid, complete, and satisfactory development than that of animals; first, because they are far more prolific, which gives much greater choice in each renewed selection (besides favouring a rapid extension of the improved breed); and next, because instead of that "delicacy of constitution" often found in high-bred animals, the very opposite character will prevail in the pedigree plant, which is descended from a line of ancestors, *each of which was the most vigorous of its year*, and possesses in combination those various good properties by which they, more successfully than others, withstood the vicissitudes of season experienced during the years of selection. In illustration of these principles of selection, I now give the following results, due to their influence alone,—as the kind of seed, the land, and the

ONE OF THE

RIGINAL TWO EARS
A FIELD OF RED
EST QUALITY OF RED

SELECTED IN 1857 FRO
NURSERY WHEAT, TH
WHEAT GROWN IN ENGLA

ORIGINAL TWO EARS
Containing together 87 grains

One prime grain produced 10 ears containing

79 76 74 73 69 68 68 66 60 55 = **688**

One grain from this ear produced 17 ears (besides 5 green ones), containing

The finest 10 ears that could be selected from *the whole produce of the other* 86 *grains* contained

70 67 63 63 63 60 57 52 52 51 =

Continued for one year more, but abandoned, as the produce was evidently inferior

AFTER TWO YEARS **REPEATED** SELECTION

The Ear containing 91 grains

9 . **91** 87 86 76 75 74 72 67 67 66 65 64 63 63 61 58 55 = **1190**

One grain from this ear produced 39 ears containing 2145 grains (*a*)

This produce selected on ac-

(*a*) Average 55 grains
(*b*) 72 ,,

One grain from this ear produced 15 ears containing 1086 grains (*b*)

74 71 * 2000 = **2145**

One grain from this ear produced **52** ears

* Owing to the extraordinary season (1860) the crop was so beaten about and injured by the wet that the two ears given separately 74 71 were the only perfect ones in this stool which was selected on account of the *number* of its ears, the other stool was selected on account of the *contents* of its ears

87 86 81 80 80 78 74 70 67 67 66 65 62 62 61 =

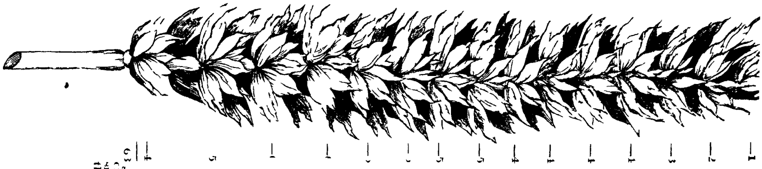
One grain from this ear produced 24 ears containing 1909 grains (*c*)

(*c*) Average 79 grains

Planted Sept 19 1861

123 106 105 97 95 92 88 85 84 81 80 79 78 75 71 68 67 66 66 66 64 64 62 50 =

THE EAR CONTAINING **123** GRAINS
BEST EAR 1861
NEW STARTING POINT 1861



63 grains on one side of this ear

AFTER FOUR YEARS **REPEATED** SELECTION

LONGEST EAR 1861

system of culture employed were precisely the same for every plant for four consecutive years; neither was any manure used, nor any artificial means of fostering the plants resorted to.

TABLE showing the importance of each additional Generation of Selection.

Year.		Length.	Containing	Number of Ears on finest Stool.
		Inches.	Grains.	
1857	Original ear	$4\frac{3}{8}$	47	..
1858	Finest ear	$6\frac{1}{4}$	79	10
1859	Finest ear	$7\frac{3}{4}$	91	22
1860	*Ears imperfect from wet season*	..	..	39
1861	Finest ear	$8\frac{3}{4}$	123	52

Thus, by means of repeated selection *alone*, the length of the ears has been doubled, their *contents* nearly trebled, and the "tillering" power of the seed increased five-fold.

Before explaining the method of procedure adopted in the above selection, I will briefly state why I commenced with so small an original ear. I had for several years previously experimented on *accidentally* large ears, irrespective of the quality of the grain they contained; the invariable result was a sample so coarse as to be almost unsaleable. Convinced that this did not naturally result from the attainment of a perfect growth in the plant, but rather arose from the fact that the large parent ears from some peculiarity of their growth themselves contained coarse grain, I determined to commence with a fine *quality* of grain irrespective of the size of the ear, trusting to pedigree for the gradual attainment of fine ears. I therefore started with the "Nursery" wheat as the finest quality of red wheat known, as I have since done with several kinds of white wheat, such as Colonel le Couteur's "Bellevue Talavera" (kindly sent to me by the Colonel for that purpose),* "Hunter's White," and several kinds of Australian white wheat, which were all fixed upon on account of their quality alone.

The plan of selection pursued above is as follows:—A grain produces a "stool," consisting of many ears. I plant the grains from these ears in such a manner that each ear occupies a row by itself, each of its grains occupying a hole in this row; the holes being 12 inches apart every way. At harvest, after the most careful study and comparison of the stools from all these grains, I select the finest *one*, which I accept as a proof that its parent grain was the best of all, under the peculiar circumstances of that season. This process is repeated annually, starting every year with the *proved* best grain, although the verification of this superiority is not obtained until the following harvest.

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* This was originally raised by Colonel le Couteur from a single grain. The ears and grains sent me by the Colonel in 1860 are absolutely identical in character with specimens grown in 1841, and now in the collection of the Society, showing how the influence of the original selection has been maintained for nearly twenty years.

During these investigations no single circumstance has struck me as more forcibly illustrating the necessity for repeated selection than the fact, that *of the grains in the same ear one is found greatly to excel all the others in vital power.*

Thus, on reference to the foregoing diagram, it will be seen that the original two ears together contained 87 grains; these were all planted singly. One of them produced 10 ears containing 688 grains, and not only could the produce of no other *single* grain compare with them, but the finest 10 ears which could be collected from the produce of the whole of the other 86 grains contained only 598 grains; yet, supposing that this superior grain grew in the smaller of the two original ears, and that this contained but 40 grains, there must still have been 39 of these 86 grains which grew in the same ear. So far as regards *contents* of ears.

Again, this year (1861) the grains from the largest ear of the finest stool of last year were planted singly, 12 inches apart, in a continuous row; one of them produced a stool consisting of 52 ears; those next to and on either side of it of 29 and 17 ears respectively; and the finest of all the other stools consisted of only 40 ears. By planting grains so as to form a plan of the position occupied by each when in the ear, I have endeavoured to ascertain whether this superior grain grows in any fixed place, but hitherto these endeavours have proved unsuccessful.

We have thus far seen that "pedigree" in wheat, combined with a natural mode of cultivating it, has increased the contents of the ears,—let us now consider whether this combination can produce a *number* of ears equal to that usually grown per acre under the present system.

In order to ascertain this we ought to know the number of ears ordinarily grown from 7 or 8 pecks of seed, but there are really no *data* upon this point. It has, however, been considered as about equal to the number of grains in a bushel,* or under 800,000, which is about one ear for every two grains sown.

I will, then, compare the numbers grown in 1861 upon two pieces of land only separated by a hedge, where the two systems were fairly tried, the same pedigree wheat being employed as seed in both cases. In the one instance 6 pecks per acre were drilled, November 20, 1860, and the crop, resulting in 54 bushels per acre, consisted at its thickest part of 934,120 ears per acre. In the other instance 4½ *pints* per acre were planted in September in single grains, 1 foot apart every way, and the number of ears produced per acre was 1,001,880, or 67,760 ears in excess of those produced on the other side of the hedge, from *more than twenty-one times the seed* here employed. Now, as an area of a square foot is more than amply sufficient for the full development of each grain, it is clear that thin seeding is not necessarily attended by a thin crop. (See note, p. 377.)

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* Stephens's 'Book of the Farm,' 2nd edition, vol. ii., par. 4574.

Having thus seen that fine ears depend upon the full development of the plant, and that this does not occasion such a diminution of their number as makes it fall below that commonly obtained, let us proceed to examine in detail how we may so act as to produce both the finest and most numerous ears; in other words, the greatest possible crop per acre.

So radical a change as this in our mode of planting wheat will necessitate a great change also in the *time* of planting, it being evident that a grain which has to occupy a large space, and to produce from twenty to fifty ears, will require more time for its growth than one which has no such area to cover, and is expected to produce only two or three ears; hence the necessity of apportioning the quantity of seed employed to the time at which it was committed to the ground, or, in other words, of giving each grain only just so much work to do as the season of planting admits of being accomplished. The expression "season of planting" must here be understood as implying not a mere date, but "probable opportunity of growth;" and this would be affected in some measure by the differing circumstances of climate, aspect, natural or artificial richness of soil, and the character of the ensuing autumn. In determining the best distance apart at which to plant the separate grains, we can only profess to deal with seed which is the result of continued selection, for the vital powers of the different grains of ordinary wheat are so *very* unequal that it would be manifestly impossible to fix on any uniform distance, because that which would afford room for the perfect growth of the most vigorous grains would leave far more than would be required by the least vigorous. But by repeated selection, commencing annually with a single grain, the vital power becomes *equalized* in a very remarkable degree, and that in proportion to the length of time during which the process of selection has been continued. Nor is this equalization confined to their tillering powers alone, but, which is equally important, is exhibited also in the ears in their nearer approach to uniformity of size.

It is evident that the proper space and time to allow to grains planted upon this system are those which, while sufficient for their full development, leave no unnecessary room.* When the pedigree wheat is used these conditions are, upon my land, *best* fulfilled by planting the grains singly, 9 inches apart every way, very early in September. This is equal to one bushel on about six acres, and if planted later the distance apart should be proportionally diminished; so soon, however, as this reduction of the space afforded each grain interferes with its horizontal growth, the *contents* of the ears will also be affected; but even when planted at the smallest distance of which I shall presently speak, this takes place in a slight degree compared with their reduced size under ordinary cultivation.

It should, nevertheless, be borne in mind, that it is only when we fulfil all the conditions *best* adapted for success that we can expect the *fullest possible advantages* of the system. What these may amount to will be shown by the following fact:—The Pedigree Nursery wheat planted singly, September 9, 1859, in holes 9 inches apart every way, produced in 1860, notwithstanding the very disastrous character of the season, 1¼ bushels on 698 square feet of unmanured land, or 108 bushels per acre!

Thus, then, there *does* exist a possibility of greatly increasing the wheat crop; but even the above results will not surprise those who realize the fact, that while a crop of 40 bushels per acre is equal to only 500 grains upon a square foot, a single grain of pedigree wheat will frequently produce upon the same area four or five times that number, and in some instances even far more than that.

We now come to the question—Can this system be adapted to field culture, and may similar results be expected from it when carried out upon a large scale?

To this a reply in the affirmative may unhesitatingly be given. It so happened that until the harvest of 1860 I had not sufficient of the pedigree wheat to test the system under field culture, and that the summer and autumn of that year proved so wet that I was altogether unable to fulfil the conditions best adapted for ensuring its success. The results obtained, notwithstanding these unfavourable circumstances, were, considering that the harvest of 1861 was not a yielding one, such as fully to demonstrate upon a large scale the value of pedigree in wheat, both when accompanied with but little of the advantage to be obtained from a "natural" mode of cultivation, and when grown altogether in the ordinary way.

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* I have now before me a plant from a single grain from a field planted Sept. 10, 1861. This plant has upon it upwards of 40 stems, and measures 20 inches from the extremities of the leaves of opposite stems. The roots also extended 2 feet horizontally, but the parent grain occupied only a square foot, as the extremities of the roots of adjoining plants feed upon the same ground, and those of the stems interlace upon the surface.

The first case is that of a field of 10 acres, which has always been considered the *worst* wheat-field on my farm, the soil of which is light—in this field disadvantageously so—and rests immediately upon chalk. My usual crop of wheat is from 32 to 36 bushels per acre, 40 bushels being considered a very good crop; indeed, upon no single acre of all my other wheat, "not pedigree," had I as much as 36 bushels in this same harvest of 1861. The wet season prevented my planting this field until the end of October, which *was fully six weeks too late for the quantity of seed employed*, there not being sufficient time afforded to the plants to occupy the ground by tillering. Being anxious, however, without the loss of another year, to try the system upon a large scale, I planted the whole field with 10 pecks, or 1 *peck per acre*, by dropping the grains singly in the seams made by a land-presser. Notwithstanding the late planting, the crop produced 57 bushels of wheat and 140 trusses (of 36 lbs.), or 45 cwts. of straw per acre. This field was sown with wheat in 1857 and 1859; grew roots in 1856 and 1858; and in the autumn of 1859 received 307 loads of manure previous to being sown with rye and tares; on the removal of these crops 7 acres were drilled with carrots, and had 3 cwt. per acre of Lawes' superphosphate; when the carrots were taken off, both roots and leaves, a coat of manure was given, 20 loads per acre, and the wheat was sown; of the rest of the field, 1½ acres received 30 loads per acre for cabbages, and no further dressing when the cabbages were carted away.

The next case was that of a field of 8 acres, which has always been considered the *best* wheat-field I have. This was drilled, November 20, 1860, with *six pecks per acre* of the same wheat as that used in the first case. The crop consisted of 54 bushels of wheat and 112 trusses of straw (36 cwt.) per acre. This field was last in wheat in 1856, followed by two years of Italian ryegrass and roots in 1859. In 1860 it received 237 loads of manure, and grew an average crop of mangold, of which both roots and leaves were removed.

No artificial manure was applied in either instance, and both crops were "swapped," or cut close to the ground.

The peculiar properties and vital powers of the pedigree wheat remain unchanged when it is exposed to the vicissitudes of farm culture in various soils and situations. The reports received from those who have planted it this autumn are only fairly represented by the following statement: "the wheat drilled with 12 pints per acre looks quite thick enough."

In adopting my system upon a small experimental scale, say of a few acres, the best apportionment of seed to time will generally be as follows, the grain being dibbled singly in holes not exceeding 1½ inches deep at the distance—

	Between the Rows—	In the Rows—	Quantity of Seed
In August, or *early* in September	of 9 inches	of 9 inches	= 1 bush on 6 acres
In September	9 ,,	6 ,,	= 1 ,, on 4 ,,
In October	6 ,,	6 ,,	= 1 ,, on 2¾ ,,
Towards end of month	6 ,,	4 ,,	= 1 ,, on 2 ,,
After October	6 ,,	3 ,,	= 1½ ,, on 2 ,,

But in carrying out this system upon a large scale we require some way of getting in the seed more expeditiously than can be done by dibbling.

My principal object in dibbling is to insure perfect singleness and regularity of plant, with uniformity of depth. The two latter may be attained by the drill, as may the former also by adopting the following plan. The seed-cups ordinarily used in drilling wheat are so large that they deliver *bunches* of grains consisting of six or seven, which fall together within a very small area, from which a less produce will be obtained than if it had been occupied by a single grain. The additional grains are thus not only wasted, but they are positively injurious. By using seed-cups, however, which are only sufficiently large to contain one grain at a time, *a stream of single grains* is delivered, and the desired object, viz., plants from single grains, at once attained. The intervals *in* the rows will not be uniform, but they may be afterwards equalized by the use of the hoe, if it be thought necessary. These intervals will of course depend upon the velocity with which the seed-barrel revolves, which can be regulated at pleasure by a proper arrangement of the cog-wheels which drive it; but it will be necessary to fix upon the nave of the travelling-wheel of the drill itself a larger cog-wheel than is in common use. I have had these nave-wheels made to shift with facility, so that the drill may be easily rendered again available for general purposes. By drilling thus we obtain the advantage of the "broadcast" system also—*equal distribution*—as we can have the rows as close together, and the grains as thin, *in* the row as we please. The crop should be hoed, as soon as practicable, with Garrett's horse-hoe. If the seed has been sown early, this should be done *in the autumn*, as it causes the plants to tiller and occupy the whole ground before the winter sets in.

I do not know that I can better conclude this Essay than by giving a summary of the advantages which attend very early planting, apart from any increase to be anticipated in the crop.

1st. *The Extension of the Seed-time.*—By commencing in the first week in September the seed-time extends through that and the two following months, giving much greater choice of opportunity for sowing under favourable circumstances than is presented when nearly the whole work has to be performed in November—a month which too often proves so wet as upon heavy land altogether to prevent its accomplishment, and hardly ever admits of the *entire* seeding being performed either under the conditions or at the time, known to be those most conducive to success. September-planted wheat may follow clover (of all kinds), beans, peas, or early-fed rape, &c., but never immediately after rye-grass.

2nd. *The small quantity of Seed required.*—Although the saving of seed, instead of being a main object in my plan, is only a means to obtaining perfect growth, and, as it were, a necessity arising from it, we must not overlook the national importance of even this single one of its features. Were the wheat-lands of the United Kingdom drilled with an *average* of even 2 pecks per acre (1 peck for the earliest sown, and 3 pecks for the latest), the result would be a saving of three-fourths of the seed—in itself equal to nearly *a million quarters of wheat.*

Again, the small quantity of seed required renders the results of the most refined selection in the small plot practically and immediately available by their distribution over a very large area; thus I have now a field of 7 acres planted with the produce of *a single grain* planted two years ago,—one acre of it with the produce of a single ear planted 1860.

We can thus annually import from the selecting-plot to the farm, seed *one generation still further selected*, effectually counteracting the tendency to degenerate which remains even in a pedigree wheat, and which can begin to take effect only upon the selection being discontinued. The longer, however, this course of repeated selection has been continued, the greater will be the accumulated vigour of the plants, and the less readily will degeneracy reappear.*

3rd. *The rapid growth of the plant in its earlier and more hazardous stages.*—The temperature early in September is generally such as to promote not only immediate germination so that the plants frequently appear aboveground in ten days, but also their rapid subsequent growth until they begin to tiller, when they soon become so strong as to be quite beyond the attacks of their enemies; indeed as inaccessible to them *in the early autumn* as wheat grown in the usual way is in the early summer. Nor is there any danger of even the earliest planted wheat becoming "winter-proud," if we employ the proper quantity of a pedigree seed which has been trained for the purpose of tillering out flat over the surface: this being altogether a different thing from the early sowing of two bushels of seed per acre, when, the plants being crowded, growth can only take place *upwards.*

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* The importance of *continuing* the selection cannot be too much insisted upon. To discontinue it would be as unwise and irrational as the conduct of the breeder who, having brought his herd to a certain pitch of excellence, suddenly exhibited an utter disregard of those principles by which this had been accomplished; in fact, the man who once admits the value of repeated selection must also admit the necessity of its continuance, even for the mere maintenance of *perfection*, were that desirable point already attained. In nothing is it more true than in this, that "not to advance is to retrograde." The value of "pedigree" in wheat depends, as in other cases, upon its *length*.

4th. *The time afforded for Replanting in case of entire failure.*—When wheat is drilled, as proposed, early in September, the crop is usually either destroyed or *perfectly safe* within six weeks, as by this time the plants will either have succumbed to the attacks of their enemies, or will have got beyond their reach. Ample opportunity is, therefore, afforded for re-sowing if it should chance to be required. The utmost risk, therefore, encountered in adopting this system is simply that of losing the seed—one-sixth part of a bushel per acre. How slight this risk is may be gathered from the fact, that out of nearly five hundred different persons who have planted this wheat during the past autumn (1861), only *two* have reported the destruction of the crop—in one case by excessive drought, in the other by slug.

We have seen then that "pedigree" in wheat gave, *when drilled in the usual way* (at the rate of 6 pecks per acre), Nov. 20, 1860, a produce of 54 bushels per acre in the harvest of 1861, which was not a yielding one; and when we consider that this was under circumstances where the plant was so thick that the valuable properties accumulated in the seed could be only *partially* developed, we shall be inclined to place a high value upon pedigree *alone*, as applied to the wheat-crop as usually cultivated, and to confess that, while in almost every other department of agriculture, our countrymen have by patient study and experiment effected improvements which have excited the admiration of the whole world, our cereals have been comparatively uncared for.

I have written this Essay in the hope of attracting attention to this too much neglected subject, twelve years' continued investigation of which has matured in my mind the conviction that it is of the greatest national importance, and that Great Britain may yet grow enough wheat to feed her people.

The Manor House, Brighton, December, 1861.

XVII.—*On the Composition and Nutritive Value of Straw.*

By DR. AUGUSTUS VOELCKER.

BOTH Mr. Mechi and Mr. Horsfall have done good service to agriculture by the publication of their experience in feeding and fattening cattle with food, a considerable portion of which consisted of straw-chaff. In whatever light Mr. Mechi's experience in fattening cattle or Mr. Horsfall's dairy management may be regarded, the merit cannot be denied to these gentlemen of having succeeded in directing the attention of the British farmer to the use of straw as an economical feeding-material.

Many farmers form much too low an estimate of the feeding value of every kind of straw, except pea-haulm. On the other hand, the views of others respecting the nutriment contained in straw are so unmistakeably exaggerated that, with some degree of justice, they are made a laughing-stock at the market-table. The main anxiety of the first-named class seems to be how to tread into manure all the straw grown on the farm; that of the second, how to stuff stock with all the straw at their disposal: the creed of the former being that neither little nor much will do their cattle any good, whilst the latter hold that any appropriation of it for litter is an intolerable waste.

The sober-minded, observant, and intelligent agriculturist, however, knows full well that whilst wheat, oat, and barley straw when cut into chaff possess a certain feeding value, particularly when this bulky material is combined with some concentrated or more readily digestible food, they are not the less essential on the generality of farms to the production of good farmyard manure. On most farms, indeed, the want of straw is felt much more on account of the difficulty of preserving the most valuable constituents of the liquid and solid excrements which arises from an insufficient supply of litter, than because an economical substitute for this kind of bulky food cannot be found.

Were it the object of this paper to discuss specially the use of straw as a manure, or rather a manure-producing and preserving agent, I might show that on most farms it is not only the cheapest but also the most efficient and valuable of the bulky materials at command for converting the excrementitious matters of our domestic animals into good yard-manure. But as I intend to direct the attention of the reader more particularly to the feeding properties of straw, I shall offer only a few observations on its manurial properties.

The intrinsic fertilising value of the straw of our cereal crops —that is, its fertilising value as far as this is dependent upon the presence of certain organic and mineral constituents—is, I conceive, very insignificant. Its chief merits are as an absorbent of the most valuable portions of the excrements of animals, and as the best fixer of the ammonia which is always generated when excrementitious matters in contact with porous materials and a sufficient quantity of moisture enter into active fermentation. The action of straw in fixing ammonia may be thus explained. During the fermentation of dung the woody fibre of straw is converted by degrees into ulmic, humic, and similar organic acids, which impart to liquid manure or to the drainings of dungheaps a more or less dark brown colour. The gradual resolution of the nitrogenised part of the excrements into ammoniacal compounds proceeds simultaneously with the formation of organic acids belonging to the humic acid series. All the acids of that series possess great affinity for ammonia, in virtue of which they unite with the ammonia of the volatile carbonate of ammonia, which, without the addition of a proper quantity of litter, would evaporate from a heap of fermenting excrements. Straw thus furnishes the raw material for the production of a number of organic acids, which, by laying hold of ammonia, preserve that most valuable constituent in our manure.

The indirect fertilising value which attaches to this important property of straw, in virtue of which rotten straw prevents the loss of ammonia in dungheaps, in my opinion, is far greater than its intrinsic manuring value, which is dependent upon the various small proportions of nitrogen, potash, phosphoric acid, silica, and other constituents which it contains. These constituents can, I believe, be supplied in various artificial manures and refuse materials, more economically than in straw. But I do not see clearly how the most valuable portion of the dung is to be preserved without straw, and how the comfort of cattle is to be secured without a sufficient quantity of litter, or what economical and available substitute can be found for straw applied as litter. I am therefore inclined to attach much more value to straw than most theoretical men, and yet can go a long way with those farmers who broadly and somewhat vaguely state that it is not manure but only litter.

As straw contains only from 14 to 17 per cent. of moisture, there is in it about as much solid matter as in meal and other kinds of dry food, although it is considered to be worth only from 20*s*. to 30*s*. per ton.

The bulk of straw, however, includes a large proportion of woody fibre, which, if digestible at all, is only partially assimilated in the system. Still, assuming that not more than one-third of the weight of straw is digested by cattle and probably less by horses and sheep, and granting that the assimilable part is not food of the most nutritious character, straw will still have to be regarded as a more economical feeding material than any other which can be supplied. It is undoubtedly a fact that some practical feeders are in the possession of the secret of converting considerable quantities of straw into beef. What this secret is, perhaps, is not known even to themselves. It may be that the combination in which straw is given, or the preparation to which it is submitted before it is placed in the feeding-troughs, has something to do with the success that attends its use; but it is yet more probable that on farms where straw is largely and economically cut into chaff and given to cattle, its condition, from early harvesting and other influences, is better than in other localities where the practice prevails of allowing corn to become over-ripe before it is cut. In consequence of this mischievous practice, straw gets more woody and less digestible than it would have been had the corn-crop been cut earlier. Further on several analyses will be given to show how much the composition and nutritive value of straw depend on the condition in which it is harvested. Indeed, the differences in the composition of somewhat under-ripe and over-ripe wheat or oat straw, are greater than the variations which may be noticed on comparing with each other the composition of wheat, oat, and barley straw. No very broad or permanent distinction, in fact, exists between wheat, oat, and barley straw. It would appear that in certain districts each variety in its turn becomes superior as food—each kind is preferred and exclusively retained for that purpose; whilst, in other districts, each is consumed for litter. Moreover, the natural preference shown by stock for one kind or the other affords a practical evidence that the farmer in each case may have a good reason for the choice which suits his locality. We must therefore always expect to meet with great diversity of opinion amongst practical men respecting the nutritive value of wheat, oat, and barley straw. That pea-haulm is too good to be trodden into manure is admitted by all. When properly got in, pea-straw is, indeed, a valuable feeding substance. With respect to the nutritive properties of bean-stalks, again, great diversity of opinion prevails—some considering them almost as nutritious as clover-hay, and others only fit for litter.

The ash or the inorganic part of many varieties of wheat, oat, and barley straw, as well as of bean and pea straw, has been carefully examined by different chemists. Whilst we have on record a large number of reliable ash-analyses, comparatively speaking few organic examinations of straw have been made. With but few exceptions the published organic analyses are not sufficiently explicit for practical purposes, and hence it is not surprising that men who base their opinion on such imperfect or partial analyses should make exaggerated statements respecting the high feeding value of straw. In most of these analyses we find the components grouped together in the following manner:—

1. Water.
2. Nitrogenised substances.
3. Non-nitrogenised substances.
4. Mineral substances (ash).

1. The amount of water in well-harvested straw when the corn is stacked varies from 25 to 36 per cent. After stacking a good deal of water evaporates, and the amount soon sinks to 16 or 18 per cent. Straw being a very hygroscopic substance is much damper in autumn and spring than in summer, or in a wet than in a dry month. I have found as little as 8 per cent. and as much as 19 per cent. of water in straw of the same kind taken at different times from the outside of the same stack. Making every allowance for variations depending upon the state of the atmosphere and on the age of the straw, 16 per cent. may be taken as fairly representing its average proportion of water.

2. The group of nitrogenised substances includes albumen and vegetable casein—two compounds soluble in water—and vegetable fibrin and other albuminous compounds, which are insoluble in water, but readily rendered soluble by weak alkaline solutions. All the nitrogenised compounds contain about 16 per cent. of nitrogen, and, besides carbon, oxygen, and hydrogen, small quantities of sulphur and phosphorus. They resemble each other so closely in composition and properties as to be scarcely distinguishable. As the type of this interesting class of compounds we may regard vegetable albumen—a substance analogous if not identical in properties and composition with the white of eggs. On account of the close resemblance of vegetable casein, fibrin, &c., to albumen, the compounds of this group are often called albuminous matter. By a simple chemical process all furnish a substance which its discoverer, Professor Mulder, named protein. According to this illustrious chemist, albuminous substances are combinations of protein with small quantities of sulphur and phosphorus, and hence they are termed frequently protein compounds. Not only are these vegetable substances nearly identical in composition and properties, but they likewise resemble so intimately animal casein, albumen, and fibrin, or those materials of which the flesh and blood of animals principally consist, that they have been called with much propriety flesh or muscle forming principles. As the animal organism has not the power of constructing these combinations, so essential to the support of life, from other materials, although the latter may contain nitrogen, it is evident that all

good vegetable food must contain a fair proportion of albuminous substances. Except in the case of pea-haulm, the proportion of albuminous matter in straw is not large. It varies considerably in straw of the same kind, according to the state of maturity in which corn is harvested, it being larger in straw not fully ripe. The average percentage cannot be precisely determined, but on the whole we may say that well-harvested straw of good feeding quality contains from 2 to 3 per cent., and inferior samples from 1½ to 1¾ per cent. of albuminous substances. In some cases the amount exceeds 3 and even 4 per cent.

3. The *non-nitrogenized substances* are as follows:—

a. Oil, fatty, and waxy matters, with more or less chlorophyle.
b. Sugar.
c. Gum and mucilage.
d. Extractive matters, and occasionally bitter principles.
e. Cellulose; and, lastly,
f. Woody fibre.

In some published analyses starch is mentioned as a constituent of straw, but this is a mistake. Neither the straw of our cereals nor that of peas or beans contains any starch—a fact which any one may readily ascertain if he will either apply tincture of iodine directly to a fragment of straw; or, better still, if he boil down a quantity with water and add a few drops of tincture of iodine to the perfectly cold and clean filtered decoction, when the non-appearance of the characteristic blue colour of iodide of starch will indicate the absence of every trace of starch.

It is much to be regretted that writers on agricultural matters, and even persons who by the public at large are considered scientific men, often employ distinct chemical terms in a very loose manner, and that they frequently leave the sure ground of ascertained facts, on which alone in chemistry opinions can be based, to launch into the realms of fancy and unauthorised assumption. When it is stated in many published analyses that straw contains some 15 to 20 per cent. of starch, the practical men experienced in the fattening properties of barley-meal and similar starch-containing food, on comparing that experience with the results obtained by straw-feeding, cannot but have their confidence in chemistry greatly shaken.

Again, misconceptions appear to exist in the minds of some of the advocates of straw as to the amount of fat and oil which it contains. These, together with a small quantity of wax and chlorophyle, seldom exceed 2 per cent., and are often less than 1 per cent. But it has been stated that straw contains as much as 20 per cent. of fat, from a confusion between fat and fat-forming matters—a term sometimes applied to the whole group of the non-nitrogenized substances. Such mistakes are often disseminated by non-scientific men, who meddle with subjects on which they are but imperfectly informed; in which case their theoretical deductions, resting on no sound basis, naturally do not tally with the observations of practical men. Due account being taken of the mischief which palpable errors in science produce in the popular mind, it becomes as much the duty of the scientific chemist to expose errors as to enrich our treasury of chemical knowledge by fresh discoveries.

Little need be said respecting the gum and mucilage in straw. Their proportion, though not large, is appreciable, especially in somewhat under-ripe samples, in which much more sugar is likewise found than in over-ripe samples. Indeed, in the latter the amount of sugar is scarcely appreciable.

Cellular or woody fibre constitutes the bulk of straw, being, of course, less valuable than any of the preceding constituents. The various non-nitrogenized substances which enter into the composition of straw contain, without exception, a large proportion of carbon, for which reason they are sometimes called carbonaceous matter. Their use in the animal economy is of a twofold character—either to supply the materials for the formation of animal fat, or to support respiration and consequently animal heat. These different carbonaceous substances are not, however, equally well adapted to either of these uses, and may be divided, according to the fitness and readiness with which they fulfil the one or the other function, into—

1. Fat-producing substances.
2. Heat-producing or respiratory substances.
3. Indigestible substances.

To the first belong the oil, fat, and waxy matter, which in straw, as already mentioned, seldom amount to much more than 1 per cent. Oily and fatty vegetable substances are eminently well adapted to the laying on of fat in animals, inasmuch as the composition of vegetable fat is analogous if not identical with the several kinds of fat found in the bodies of animals. The fatty matters of food, without undergoing much change, are therefore readily assimilated by the animal organism, and applied when given in excess to the storing up of animal fat. On the other hand, substances rich in starch are specially fitted to support respiration. Oily and fatty matters, however, when given with a scanty supply of starchy food, become available for the support of respiration; and again, gum, starch, and sugar, when given to fattening beasts in excess, are transformed into animal fat. There is thus no essential difference between the fatty or starchy constituents of food in so far as their uses are concerned, but each according to circumstances can lend itself to the work which is the more peculiar province of the other. The proportion of carbon in fatty matter amounts to rather more than 80 per cent., and is much larger than in gum, sugar, or starch. Oil and fat, for this reason, are not only better producers of fat than starchy and sugary compounds, but are likewise more powerful agents for the support of respiration and the maintenance of animal heat—the heat generated in the body being proportionate to the amount of carbon consumed in a given time during respiration. Gum, sugar, mucilage, starch, and a few similar compounds may be represented as consisting of carbon and water only, and on account of the simplicity of their composition they are well adapted to support respiration. The quantity of carbon consumed by the respiration of animals varies at different times and in different species, according to the rapidity of their breathing and their mode of living. Under all circumstances, however, it is considerable, especially in the case of ruminating animals. Thus cows consume four-ninths of the carbon contained in their ordinary daily food by respiration, and throw it off in their exhalations in the form of carbonic-acid gas. Hence the absolute necessity of supplying large-sized animals with abundance of carbonaceous food.

As straw contains no starch and but a small proportion of gum, mucilage, and sugar, and thus is deficient in the better kinds of respiratory constituents, it cannot rank high as a heat-producing material, unless it can be shown that cellular and woody fibre can be assimilated and used for the same purpose for which starchy compounds are usually employed in the animal economy.

The question then arises—and it is an important one—is cellular or woody fibre digestible or not? and upon a correct and trustworthy answer to this question mainly depends the decision whether or not straw is really as nutritious as some maintain. To arrive at as trustworthy a reply to this question as can be given in our present state of knowledge, we have to inquire, in the first place, what is understood by woody fibre?

If any vegetable substance—straw, for instance—is treated successively with cold and boiling water, next with alcohol and ether, then with a dilute solution of caustic potash, and finally with dilute sulphuric acid, an insoluble residue is obtained, differing in quality and texture according to the original material used in the experiment. This insoluble residue is called by chemists indiscriminately cellular or woody fibre. It is in reality generally a mixture of cellulose, the substance of which the walls of the cells of plants consist, and of woody substances which are deposited around the original cell-walls. These woody substances—"incrusting matter," as they are called by vegetable physiologists—constitute the true wood or woody fibre of plants. In their composition they closely resemble cellulose, which is more abundant in young plants than in those of more advanced growth. The older and harder the plant, the more woody or incrusting matter it contains. In green herbage, the insoluble residue which is obtained by the above-mentioned treatment chiefly consists of cellulose or cellular fibre; whilst in fully matured and over-ripe herbs, this insoluble residue principally consists of incrusting matter or true wood. In intermediate stages between a green, succulent condition and a dry, hard, fully matured stage of growth, we obtain variable mixtures of cellulose and woody fibre. The same process, it will be noticed, which is employed for preparing woody fibre, likewise furnishes cellulose. Unfortunately we possess no means of separating the two from each other, and hence the chemical processes by which the woody and cellular fibre in plants is determined in our laboratories are not calculated to give us more than at the best a very crude idea of the true character of the insoluble matter which constitutes the bulk of straw. No difficulty is experienced in determining with precision the amount of starch or sugar in a plant, but when we attempt to ascertain in two or three separate portions the amount of woody fibre in each, it is next to impossible to obtain corresponding results. But although we speak of cellulose and of woody fibre as of two separate and distinguishable substances which exist in plants under conditions as variable in texture and other physical peculiarities as in their physiological effect upon the animal, the chemist is not in a position to distinguish the one from the other by means of analysis; and it should be remembered that the physical and chemical properties and general character of many organic bodies are often extremely different, whilst their chemical composition is precisely the same. The mere composition of cellulose or woody fibre, therefore, does not afford a sufficient insight into their true character, and leaves altogether untouched the question whether these substances are digestible or not.

As long as we are unacquainted with more perfect analytical methods, we cannot expect to ascertain by analysis whether cellular and woody fibre is digestible, wholly or in part, and to what extent. Here, as in so many other matters which have scarcely been touched upon by scientific men, the agriculturist must be guided by his own experience, and not by the rash counsels and exaggerated statements of theorists, who are incompetent to form a sober and unbiassed opinion on a moot question. We know, indeed, that the condition of the woody fibre affects the nutritive value of all food in no mean degree. Whilst in root-crops left too long growing on the land, or the fibre of grass and clover left standing until dead-ripe, these tissues are not readily digested, there can be no doubt that the soft fibre of young grass, clover, and roots is readily assimilated in the animal organism, and transformed into starch, sugar, and finally into fat. For this reason grain-crops, more especially oats, when harvested early, produce straw which is greatly more nutritious than that of an over-ripe crop. In some parts of Scotland it is customary to cut the oat when the top of the haulm is still quite green; and it is upon straw of that description that store cattle are kept during the winter almost entirely. The variable condition in which grain-crops, as well as peas and beans, are harvested in England, fully explains the various shades of opinion which are entertained by practical men respecting the feeding properties of the straw of these crops, and the contradictory statements of writers on this subject.

For the same reason the *practical* solution of the question whether woody fibre is digestible or not, is surrounded by peculiar difficulties. Taking experience for our guide, it may be answered with equal truth in the affirmative or in the negative; for in a young, tender condition we know from experience that cellular and woody fibre is digestible, whilst in a hard, dry, over-ripe state it is for the most part indigestible. Direct feeding experiments, highly desirable though they may be, will leave much uncertainty, however carefully they have been made, unless special regard is paid to the condition in which the straw is given to the animals; and after all, as it is not possible to describe with absolute precision its state of maturity and condition, no practical feeding experiment, be it ever so carefully conducted, can afford absolute numerical results, indicative of the extent to which the woody fibre is digestible in all, or even the majority, of instances.

Feeding experiments instituted for the purpose of ascertaining to what extent the woody fibre of food is assimilated in the animal organism are highly desirable, but at the same time they are most laborious and costly. They require to be undertaken on a tolerably large scale, and cannot well be executed by a practical farmer, for want of scientific appliances, nor even by an agricultural chemist, who cannot specially provide all the expensive arrangements and command all the assistance necessary to render chemico-physiological experiments applied to agriculture thoroughly satisfactory. A further difficulty arises from the fact that the same description of food which is assimilated in a great measure by one kind of animal often remains to a much greater extent undigested when given to another. Thus it has been proved by direct experiments that cows can extract a great deal more nourishment from straw-chaff than horses, and that sheep do not appear to digest chaff so readily as cattle.

Although chemical analysis cannot decide with anything like precision the most interesting and practically important point on which the whole controversy of the feeding value of straw hinges, we must not suppose that it is altogether useless to submit to analysis the various kinds of straw used on the farm. I hope to be able to show that the investigation undertaken by me at the request of the Chemical Committee of the Royal Agricultural Society has brought to light several matters of considerable practical importance, and is suggestive of others of interest. The following points, at all events, can be readily ascertained. In the first place, we can determine with precision the amount of oil, certainly the most valuable constituent of straw; secondly, the proportion of albuminous or flesh-forming matters; and thirdly, the amount of organic substances soluble in water, such as sugar, mucilage, gum, extractive matters, &c. The mineral portion or ash, of course, is easily ascertained by burning a known quantity of straw in a platinum capsule, and weighing the ash which remains behind.

The proportion of oil is easily obtained by exhausting a weighed quantity of straw in an appropriate apparatus with ether, and evaporating the ethereal solution of oil to dryness. Albuminous compounds are now usually determined in the indirect manner by combustion with soda-lime, and multiplication of the percentage of nitrogen by 6¼. A weighed quantity, exhausted with cold and afterwards with boiling water, produces the proportion of soluble matter, consisting of sugar, mucilage, extractive matter, and soluble saline matters. If the portion of straw previously exhausted with ether and water is subsequently boiled with a solution containing 1 per cent. of caustic potash, the insoluble albuminous compounds are dissolved; and by treating the residue left after boiling with potash-solution, with dilute sulphuric acid, and finally washing again with water, we obtain the amount of cellular and woody fibre in the straw.

It has been stated already that this process does not furnish corresponding results in two or three separate determinations. Nevertheless it is desirable in detailed analyses to have recourse to this process, which at least allows us to form some idea of the readiness with which the part of straw which is insoluble in water, and which may be termed crude woody fibre, is attacked by dilute alkalies and acids. There can be no doubt that the different alkaline and acid secretions in the animal organism exercise similar, probably even more energetic effects, than this upon the crude woody fibre. The treatment with dilute alkalies and acids, therefore, affords a better insight into the digestibility of the bulk of straw than the mere exhaustion with water.

At the same time, however, it may be noticed that the method of Sinclair, who endeavoured to determine the nutritive value of different grasses by ascertaining the proportion of matters soluble in water, furnishes comparative results which enable us to form a tolerable good opinion of the feeding value of straw. Indeed I find that the more nutritious samples invariably produce the largest amount of watery extract.

In many of the published analyses nothing more than moisture, ash, and albuminous compounds are determined; all the rest is arrived at by difference. It is evident that such imperfect analyses must lead to practical errors; for in these analyses oil, sugar, and other soluble matters are thrown together with crude woody fibre, and the whole group is said to consist of fat and respiratory constituents, although only a portion of the whole exists in reality in a condition in which it can be assimilated by animals.

WHEAT-STRAW.

The following results were obtained on analysing a sample of well-harvested wheat-straw, which was neither under nor over ripe:—

General Composition.

Water	13·33
Soluble organic matters	5·54
Soluble inorganic matters	1·13
Insoluble organic matters	76·92
Insoluble mineral matters	3·08
	100·00

Detailed Composition.

Water	13·33
Oil	1·74
*Albumen and other soluble protein compounds	1·28
Sugar, mucilage, extractive matters, &c. (soluble in water)	4·26
Digestible fibre, &c.	19·40
Soluble inorganic matter	1·13
†Insoluble protein compounds	1·65
Indigestible woody fibre	54·13
Insoluble inorganic matter	3·08
	100·00

***Containing nitrogen**	**·206**
†Containing nitrogen	**·264**
Total percentage of nitrogen	**·470**
Equal to protein compounds	**2·93**
Total ash	**4·21**

A glance at these analytical results will show that hard and dry as wheat-straw appears to be, this sample, nevertheless, yielded no less than 5½ per cent. of organic matters to cold and boiling water. The portion insoluble in water, or the crude woody fibre, amounted to exactly 80 per cent.; a very large quantity—of which, however, when treated with dilute caustic potash, and afterwards with dilute sulphuric acid, nearly 20 per cent. was rendered soluble. The portion thus rendered soluble is described in the preceding and following analyses as digestible fibre. After the separation of the insoluble albuminous compounds, mineral matters, oil, and digestible fibre, the proportion of woody matters, as given in the detailed composition, amounted to 54 per cent. in round numbers. This is described as indigestible woody fibre, but it is quite possible that a considerable portion of it may be assimilated in the animal organism. At any rate it is an interesting fact that a substance so dry and unpromising-looking as straw, yielded to water and dilute alkaline and acid liquid nearly one-half of its weight.

Another point of interest is the appreciable quantity of oil; it is a nice yellow, sweet-tasting oil, which no doubt renders straw more palatable, to a certain extent more digestible, and certainly more nutritious than it would be without this constituent. In the instance before us we have 1¾ per cent. of oil; a ton of straw accordingly contains 39 lbs. of oil.

Again, attention may be directed to the albuminous compounds, which amount to 3 per cent. in round numbers. It will be seen that rather more than one-half of these compounds is insoluble, and the rest soluble in water.

On the whole, wheat-straw having a composition similar to the sample analysed by me is nutritious, and when cut into chaff may be used with advantage as a feeding material. Several partial analyses of other specimens have shown me that this and other kinds of straw vary exceedingly in composition, and consequently also in quality.

That the composition of the straw is, indeed, influenced by the degree of maturity in which the corn is harvested, will appear clearly on comparison of the following analytical results, obtained on the examination of two samples of wheat-straw, the one fairly ripe, the other over-ripe:—

General Composition of Wheat-straw.

	Ripe.	Over-ripe
Water	8·14	9·17
Substances soluble in water	8·77	4·81
Substances insoluble in water	83·09	86·02
	100·00	100·00

Detailed Composition.

Water	8·14	9·17
Oil	1·10	·65
*Soluble protein compounds	·50	·06
†Insoluble protein compounds	1·62	2·06
Gum, sugar, and extractive matters	6·28	3·46
Crude woody fibre	79·31	82·26
Soluble mineral matters	1·99	1·29
Insoluble mineral matters	1·06	1·05
	100·00	100·00
*Containing nitrogen	·08	·01
†Containing nitrogen	·26	·33
Total percentage of nitrogen	·34	·34
Equal to protein compounds (flesh-forming matters)	2·12	2·12
Percentage of ash	3·05	2·34

In explanation of these results, it is necessary to state that both samples were kept in a warm room for some days before they were analysed, which accounts for the small percentage of moisture found in them. The principal points of interest to be remarked are—1st, the greater amount of sugar, gum, and extractive matters (nearly twofold); next, the greater amount of oil; and lastly, the smaller proportion of woody fibre found in the fairly-ripe sample as compared with that which was over-ripe, by which the superiority of the former as feeding material is sufficiently proved. Indeed, whereas the former is nutritious and well fitted for cutting into chaff and mixing with sliced or pulped roots, the over-ripe sample is hardly suited for feeding purposes, and should be trodden into manure.

A striking difference will be noticed in the relative proportions of soluble and insoluble albuminous compounds in the fairly-ripe and in the over-ripe specimens; in the latter there is scarcely any soluble albuminous matter, nearly the whole having become insoluble. In both samples the total amount of albuminous or flesh-forming compounds is smaller than that given in the preceding full analysis of another sample. The percentage of ash in both these last specimens is unusually low.

The ashes of several varieties of wheat-straw have been analysed by Messrs. Way and Ogston, who give as the mean result of ten analyses the following numbers:—

Potash	12·14
Soda	·60
Magnesia	2·74
Lime	6·23
Phosphoric acid	5·43
Sulphuric acid	3·88
Silica	67·88
Peroxide of iron	·74
Chloride of sodium	·22
	99·86

The ash of wheat-straw, it will be seen, is very rich in silica—a constituent found in the straw of all cereals in preponderating proportions. The amount of phosphoric acid and of potash is not large. The percentage of ash in wheat-straw varies exceedingly; on an average it amounts to about 4½ per cent., but I have found it as low as 2½ per cent. When I first met with this small percentage I took the precaution of repeating the determination, and obtained from each trial closely agreeing results. It is worthy of remark that the straw in question was by no means weak, but as stiff as could be desired. It may therefore be doubted whether the weakness of straw arises, as is generally assumed, from a deficiency of mineral matter, more especially of silica.

This is a subject well deserving further investigation, which I hope to take up at a future period. But whilst reserving for future discussion the causes of weakness of straw, I cannot refrain from stating in passing that I have never met with a single instance in which the application of silicate of soda to wheat has had the slightest effect upon the crop; and that therefore, as far as my practical experience extends, I am bound to say that silicate of soda does not answer the purpose for which its use has been suggested, viz., that of strengthening the straw of wheat, oats, and barley.

WHEAT-STUBBLE.

Although wheat-stubble is not used for feeding purposes, its analysis may here find a place, for it may be useful to compare the composition of stubble with that of wheat-straw.

The sample from which the following analysis was made was gathered on a dry day in the middle of December, from a field of the College Farm, Cirencester. Examined directly afterwards it was found to contain 17½ per cent. of moisture, and was thus drier than wheat-straw before stacking. This stubble contained in 100 parts:—

General Composition.

Moisture	17·66
Substances soluble in water	5·83
Substances insoluble in water	76·51
	100·00

Detailed Composition.

Water	17·66
Oil	·42
*Albuminous compounds	2·94
Extractive matters (soluble in water)	5·01
Crude woody fibre	71·04
Mineral matters (ash)	2·93
	100·00

*Containing nitrogen .. ·47

Stubble, then, contains as much nitrogenized matters as straw, which it closely resembles in other particulars, the chief difference being its somewhat smaller proportion of oil.

It has been stated by practical men that stubble has no direct value as a manure, and not much as litter. If this be so, it follows inevitably that wheat-straw has no *direct* value as a manure, for both straw and stubble contain as nearly as possible the same proportions of nitrogenized and carbonaceous and mineral matters.

BARLEY-STRAW.

Barley, especially if good malting barley, is generally allowed to turn more yellow in the field than any other grain-crop. The barley-straw on our farms, therefore, is seldom so nutritious as it might be, if the crop were cut down in a less advanced stage of maturity. The following analysis was made of barley-straw, which I am inclined to term dead-ripe, although it is the usual condition in which it is seen in our neighbourhood:—

General Composition.

Water	15·20
Soluble organic matter	2·92
Soluble inorganic matter	2·88
Insoluble organic matter	77·62
Insoluble mineral matter	1·38
	100·00

Detailed Composition.

Water	15·20
Oil	1·36
*Albumen and other soluble protein compounds	·68
Sugar, mucilage, extractive matters, &c. (soluble in water)	2·24
Digestible fibre, &c.	5·97
Soluble inorganic matter	2·88
†Insoluble protein compounds	3·75
Indigestible woody fibre	66·54
Insoluble inorganic matter	1·38
	100·00

***Containing nitrogen**	**·11**
†Containing nitrogen	**·60**
Total percentage of nitrogen	**·71**
Equal to protein compounds	**4·43**
Total percentage of ash	**4·26**

These results suggest one or two remarks.

In the first place: That the appreciable quantity of oil contained in barley, as in wheat-straw, must contribute to its nutritive value.

Secondly: That the amount of sugar, gum, and other soluble matters in this sample is very small indeed. This I find always to be the case, not only with this, but with other kinds of over-ripe straw.

Thirdly: That this specimen contained a good deal more indigestible woody fibre than wheat-straw, to which it is altogether inferior in feeding qualities. Barley-straw is usually considered superior to wheat-straw as a feeding substance, but the preceding analyses show plainly that this opinion does not hold good in every instance.

Fourthly: It is worthy of special notice that the part of barley-straw which is insoluble in water, or the crude fibre, on treatment with dilute caustic-potash solution and dilute sulphuric acid, is diminished in quantity to a much smaller extent than the wheat-straw which I submitted to the same process. Whereas these re-agents extracted in round numbers 20 per cent. of digestible fibre from wheat-straw, they furnished not more than 6 per cent. in the case of barley-straw. I do not think, however, that in the latter straw there is anything of a peculiarly hard nature which protects it from the action of these solvents; but that the difference in this respect is due entirely to the over-ripe condition of the barley-straw and the better condition in which the wheat-straw was examined. Reverse the condition of the two kinds of straw, and it will be more than probable that opposite results will be obtained.

Lastly: It may be remarked that the proportion of flesh-forming matters in the specimen analysed is considerable, and larger than in wheat-straw.

Barley-straw yields, when burnt, on an average from 4 to 5 per cent. of mineral matters thus combined.

Average Composition of the Ashes of Barley-straw reduced from Three Samples.

Potash	18·40
Soda	·68
Magnesia	4·13
Lime	8·08
Phosphoric acid	3·26
Sulphuric acid	2·13
Silica	54·56
Peroxide of iron	1·81
Chloride of sodium	6·95
	100·00

In contrast with the preceding analysis of over-ripe barley-straw, I will now mention the results obtained on analysing a fairly-ripe specimen grown on our farm last season.

Barley-Straw (not too ripe) taken from Farm Buildings, October 31.

General Composition.

Water	17·50
Substances soluble in water	12·40
Substances insoluble in water	70·10
	100·00

Detailed Composition.

Water	17·50
Oil	1·17
*Albuminous compounds	5·37
Mucilage, sugar, extractive matters, and cellular fibre	71·44
Mineral matters	4·52
	100·00
*Containing nitrogen	·86

In this analysis it will be seen no less than 12½ per cent. of matters soluble in water, and containing a good deal of sugar, were obtained, thus showing plainly to what extent the solubility, and with it no doubt the digestibility, of different samples may vary.

Let it be remembered that the analyses were not made with picked samples, but with samples such as I found them in the rick-yard on our farm. The inferior and over-ripe sample was grown in 1860, the other in 1861. Now any farmer who, with a view to testing practically the nutritive quality of barley-straw, tried feeding experiments in 1860, would have found that it was very poor stuff, hardly fit for food; whilst in 1861 the same kind of straw would have given most satisfactory results. Thus it happens that the same kind of straw is denounced by one man as only fit for the dungheap, and by another elevated to almost equal rank with hay.

In my opinion barley-straw, not too ripe, is nearly equal to oat-straw reaped in the same state of maturity, and superior to wheat. It is usually richer in albuminous compounds than wheat-straw, although the larger proportion of albuminous matters found in barley-straw is in part due to some clover and grass which gets mixed up with the barley-crop. Barley-straw then should not be wasted as litter, but given to cattle, especially young stock, both on account of its softer texture and its larger proportion of nitrogenised matter, with which young growing stock require to be more liberally supplied than fatting beasts.

OAT-STRAW.

A specimen of oat-straw, grown in 1860, was submitted to a complete analysis, and furnished the following results:—

General Composition.

Water	13·70
Soluble organic matter	8·04
Soluble inorganic matter	2·76
Insoluble organic matter	72·84
Insoluble mineral matter	2·66
	100·00

Detailed Composition.

Water	13·70
Oil	1·69
*Albumen and other soluble protein compounds	·44
Mucilage, extractive matters (soluble in water)	7·60
Digestible fibre, &c.	29·27
Soluble inorganic matter	2·76
†Insoluble protein compounds	2·31
Indigestible woody fibre	39·57
Insoluble inorganic matter	2·66
	100·00
*Containing nitrogen	·07
†Containing nitrogen	·37
Total percentage of nitrogen	·44
Equal to protein compounds	2·75
Total ash	5·42

On burning, oat-straw leaves on an average 5 to 5½ per cent. of ash, which has the following composition:—

Ash of Oat-straw.

Potash	19·14
Soda	9·69
Magnesia	3·78
Lime	8·07
Phosphoric acid	2·56
Sulphuric acid	3·26
Silica	48·42
Peroxide of iron	1·83
Chloride of sodium	3·25
	100·00

Like all the ashes of the straw of cereal crops, oat-straw contains a large proportion of silica, and but little phosphoric acid.

It will be seen that oat-straw contains about as much oil, and the same proportion of albuminous compounds, as wheat-straw. There are, however, some remarkable differences between them; for in oat-straw—at least in the specimen analysed—there is much more sugar and other soluble matter than in wheat-straw. It likewise appears that the crude woody fibre of the former is more easily attacked by dilute alkalies and acids; so that by this treatment 29 per cent. of digestible fibre was obtained, and the indigestible fibre was reduced to 30½ per cent; whilst in wheat-straw no less than 54 per cent. of woody fibre was found to be indigestible. It may be safely inferred from this that oat-straw is assimilated by animals to a larger extent than wheat-straw; and as it contains moreover more sugar and mucilage than the latter, and as much oil and albuminous matter, the specimen analysed by me is decidedly more nutritious than the sample of wheat-straw which I analysed. In all probability the difference is due to the fact that oats, on account of the readiness with which they shed the grain, are generally reaped in a less matured condition than wheat.

Another sample of oat-straw, grown in 1861, submitted to a less complete analysis, furnished the following results:—

Oat-straw from Farm-buildings.

General Composition.

Water	19·50
Substances soluble in water	10·85
Substances insoluble in water	69·65
	100·00

Detailed Composition.

Water	19·50
Oil	1·54
*Protein compounds	2·75
Mucilage, sugar, cellular fibre, &c.	71·39
Mineral matters (ash)	4·82
	100·00
*Containing nitrogen	·44

These results agree perfectly with the preceding in regard to the proportion of oil and albuminous matter, and tolerably well in the amount of substances soluble in water.

Having found that the nutritive properties of straw are greatly affected by the state of maturity at which the crop is harvested, and come to the conclusion that it is very desirable to reap oats in a somewhat green condition, I took an opportunity carefully to investigate the nature of the differences which are exhibited by oat-straw in a green, in a fairly ripe, and in an over-ripe condition. In 1860 it will be remembered that our grain crops ripened rather unequally. This circumstance enabled me to examine oat-straw in both a green and a fairly ripe condition. In that year Mr. Coleman, Professor of Agriculture in the Royal Agricultural College, Cirencester, thought it desirable to begin the oat-harvest, whilst the straw was yet somewhat green, inasmuch as the oat-field was large, and this crop, when too ripe, is very apt to shed its seed. This field was reaped on the 20th of August, and on that day I selected some of the oats in a still somewhat green condition, and likewise some in a fairly ripe state. In the green oat-straw, examined directly after the crop was cut down, I found as much as 77 per cent. of moisture; and in the fairly ripe sample, gathered on the same day, 46½ per cent. in round numbers. In perfectly ripe straw, taken directly from the field, the proportion of moisture amounts to 30 to 40 per cent.

Both samples were submitted to complete analysis. The first—that is, the straw which was somewhat green throughout its length, and decidedly so in the upper portion, yielded the following results:—

Oat-straw (Green).

General Composition.

Water	77·14
Soluble organic matter	6·29
Soluble mineral matter	1·59
Insoluble organic matter	14·72
Insoluble mineral matter	·26
	100·00

Detailed Composition.

Water	77·14
Oil	·43
*Soluble protein compounds	1·50
Sugar, gum, mucilage	4·36
Digestible fibre	7·17
†Insoluble protein compounds	·81
Indigestible woody fibre	6·76
Soluble mineral matter	1·57
Insoluble mineral matter	·26
	100·00
*Containing nitrogen	·24
†Containing nitrogen	·13
Total percentage of nitrogen	·37
Total percentage of ash	1·85

Notwithstanding the large quantity of moisture in this sample, a very considerable amount of sugar and other substances soluble in water was obtained, and nearly as much albuminous matter as in ripe oat-straw, with only 14 per cent. of moisture. The fairly ripe sample gave the following results:—

Oat-straw (fairly ripe).

Water	46·64
Soluble organic matter	9·06
Soluble mineral matter	2·30
Insoluble organic matter	40·28
Insoluble mineral matter	1·72
	100·00

Water	46·64
Oil	·67
*Soluble protein compounds	1·67
Sugar, gum, mucilage	6·72
Digestible fibre	19·17
†Insoluble protein compounds	·93
Indigestible woody fibre	20·18
Soluble mineral matter	2·30
Insoluble mineral matter	1·72
	100·00

*Containing nitrogen	·26
†Containing nitrogen	·15
Total percentage of nitrogen	·41
Total percentage of ash	4·02

The great difference in the proportions of water in these two samples makes it difficult to compare these analytical results with each other. Deferring for the present such a comparison, I will now give the analysis of a third specimen taken from a portion of the crop of the same field, which was left standing until the 20th of September, or just one month longer, when, as might have been expected, the straw was over-ripe.

Oat-straw (over-ripe).

General Composition.

Water	35·20
Soluble organic matter	4·42
Soluble mineral matter	1·75
Insoluble organic matter	55·48
Insoluble mineral matter	3·15
	100·00

Detailed Composition.

Water	35·20
Oil	·97
*Soluble protein compounds	1·00
Sugar, gum, mucilage, &c.	2·45
Digestible fibre	21·41
†Insoluble protein compounds	1·81
Indigestible woody fibre	32·26
Soluble mineral matter	1·75
Insoluble mineral matter	3·15
	100·00

*Containing nitrogen	·16
†Containing nitrogen	·29
Total percentage of nitrogen	·45
Total percentage of ash	4·90

When taken from the field, even in an over-ripe state, straw, it will be seen, contains rather more than one-third of its weight of water. The preceding analyses are interesting in several respects. They have a direct practical bearing, which, however, will become more manifest when the proportion of moisture is become the same in each sample—or, in other words, when we examine the three samples after having been stacked for some time. In this state straw contains on an average 16 per cent. of moisture. In the following table I have, therefore, calculated the composition of these three samples with 16 per cent. moisture, and have likewise given the composition of each in a perfectly dry state (dried at 212°):—

Table showing the Estimated Composition when Dried.

	Oat-straw cut in Green Condition, Harvested on the 20th of Aug., 1860.		Oat-straw cut when Fairly Ripe, Harvested on the 20th of Aug., 1860.		Oat-straw cut when Over-Ripe, Harvested on the 20th of Sept., 1860.	
	Calculated Dry.	Calculated to contain 16 per cent of Moisture	Calculated Dry	Calculated to contain 16 per cent of Moisture	Calculated Dry	Calculated to contain 16 per cent of Moisture.
GENERAL COMPOSITION.						
Water	.	16·00	..	16·00	..	16·00
Soluble organic matter	27·52	23·12	16·97	14·25	6·82	5·72
Soluble mineral matter	6·95	5·84	4·32	3·63	2·71	2·27
Insoluble organic matter	64·39	54·09	75·48	63·41	85·61	71·92
Insoluble mineral matter ..	1·14	·95	3·23	2·71	4·86	4·09
	100·00	100·00	100·00	100·00	100·00	100·00
DETAILED COMPOSITION.						
Water	.	16·00	..	16·00	..	16·00
Oil	1·88	1·57	1·25	1·05	1·49	1·25
*Soluble protein compounds ..	6·56	5·51	3·13	2·62	1·54	1·29
Sugar, gum, mucilage, and extractive matters	19·08	16·04	12·59	10·57	3·79	3·19
Digestible fibre	31·36	26·34	35·94	30·17	33·04	27·75
†Insoluble protein compounds ..	3·54	2·98	1·74	1·46	2·79	2·36
Indigestible woody fibre . ..	29·57	24·86	37·81	31·78	49·78	41·82
Soluble mineral matters	6·88	5·76	4·32	3·64	2·71	2·26
Insoluble mineral matters	1·13	·94	3·22	2·71	4·86	4·08
	100·00	100·00	100·00	100·00	100·00	100·00
*Containing nitrogen	1·05	·88	·48	·40	·24	·20
†Containing nitrogen	·57	·47	·28	·23	·44	·36
Total percentage of nitrogen ..	1·62	1·35	·76	·63	·68	·56
Equal to protein compounds ..	10·10	8·49	4·87	4·08	4·33	3·65
Percentage of ash	7·09	6·79	7·55	6·34	7·57	6·36

The attentive perusal of these analytical results suggests the following observations:—

1. In the first place, the large proportion of albuminous compounds in green oat-straw deserves to be specially noticed: it is as large in amount as occurs on an average in ordinary meadow-

hay. Oat-straw, so harvested, ought therefore to be as useful in repairing the waste of muscle of working oxen and horses as common hay. It is indeed much relished by animals, especially by working horses, who have good reasons for their predilection, one no doubt being the larger proportion of flesh-forming matters that it contains, and another probably its more succulent and palatable condition.

2. The greater proportion of the albuminous or protein compounds exists in the green straw in a condition in which they are soluble in water, and therefore in all probability more easily digested than they are in an insoluble state.

3. Towards maturity the amount of albuminous and nitrogenised compounds dwindles down to about one-half. Thus, whilst green straw contains 8½ per cent. of nitrogenised matters, that which is fairly ripe contains only 4 per cent. The soluble and insoluble protein compounds likewise appear to diminish at precisely the same rate.

In green straw we have, in round numbers, 5½ per cent. of soluble nitrogenized matters against 2·6 per cent. in the fairly ripe sample, and 3 per cent. of insoluble protein compounds against 1½ per cent.

The question arises, what becomes of all the nitrogenised matter, which disappears with extreme rapidity when our cereal crops arrive at maturity? Although I have not made any special experiments with a view of ascertaining this point, it does not appear to me likely that this matter is all stored up in the grain; and I have not much doubt that, as observed by Messrs. Lawes and Gilbert, a considerable loss of nitrogen takes place in the growth of corn-crops, which loss is particularly noticeable when the crop arrives at maturity.

4. In over-ripe oat-straw a still further, though inconsiderable, diminution of nitrogenised matters took place. But whereas, in the two other samples, the soluble nitrogenised matter greatly preponderates over the insoluble, the reverse is the case in the over-ripe specimen. In this sample it will be seen that the insoluble protein compounds amount to $2\frac{4}{10}$ per cent, and the soluble to only $1\frac{3}{10}$ per cent.

Over-ripe straw then is not only absolutely poorer in albuminous or flesh-forming matters than fairly ripe samples, but it likewise contains these important constituents in a less soluble, and therefore less digestible, form.

5. The proportions of oil in the three samples differ but little.

6. Of sugar, gum, and other matters soluble in water, not less than 16 per cent. occurs in the green straw, as against 3 per cent. in the over-ripe straw. In the fairly ripe sample 10½ per cent. of sugar, gum, &c., were found, or a proportion which exceeds

that given in the first analysis by 3 per cent. According to the state of maturity, I thus found in four samples of oat-straw the following proportions of sugar and other soluble matters: 1st sample, 16 per cent.; 2nd sample, 10½ per cent.; 3rd sample, 7½ per cent.; 4th sample, 3 per cent.

Of all the constituents except oil, I consider sugar and other soluble matters by far the most valuable. Quite apart from the larger proportion of albuminous matter, green oat-straw will be found much more nutritious and palatable than fully ripe samples, because it is more succulent, and contains a great deal more sugar and other readily digestible matters.

The longer the oat-crop is left in the field, the more the proportion of sugar and other soluble organic matters diminishes, and with it its nutritive value. Hence it is bad policy to let this crop become too ripe before cutting it down. The loss in nutritive substances in that case is much more considerable than most farmers believe. Practical men, therefore, cannot be too strongly urged to cut their oat-crop before it turns quite yellow, both for the sake of the grain, which is so easily shed, and of the straw, which is so rapidly deteriorated. As soon as the haulm of oats begins to turn yellow, in about two-thirds its length, though the tops be still decidedly green, the harvest should be begun. I have had opportunities of observing over and over again that a larger yield of corn and a better sample will thus be obtained, as well as a far more nutritious straw. The deterioration in the quality of the straw and corn in warm seasons takes place so rapidly that it makes a great practical difference whether the harvest is begun a week sooner or later.

7. In the less succulent samples a larger proportion of indigestible woody fibre may naturally be expected. That it exists, this series of analyses places beyond a doubt; for whilst the green sample contained only 25 per cent. of indigestible woody fibre, the fairly ripe contained 32, and the over-ripe 42 per cent. in round numbers.

Every feeder of stock knows that hard woody matter is not easily, if at all, digested, and that sweet-tasting, succulent food containing much sugar is very fattening. It must, therefore, be his interest to prevent as much as is possible the conversion of sugar into woody fibre. Where oats are grown for home consumption, I am not at all sure that it is not more advantageous to cut down the crop when the seed is fully formed, but still milky, and the straw is still green, and to make the whole into hay, than to let the crop get ripe, and afterwards to thresh out the corn. I am inclined to think an acre of oats made into hay will furnish more nutriment to horses, which are very fond of oat-hay, than when harvested in the usual way. A good deal of expense incurred in threshing the crop and cutting it into chaff would be saved were this plan adopted.

8. We see that the crude woody fibre of oat-straw is rendered soluble to a considerable extent by dilute alkaline and acid liquids. Indeed it appears to be more easily acted upon by these solvents than that of wheat-straw; and the preference given to oat-straw as a feeding material may be partly due to this circumstance.

9. The proportions of mineral matters here exhibited do not greatly vary; but there is a material difference in the *qualitative* composition of the ash. In the green sample nearly 6 per cent. of soluble ash-constituents, and only 1 per cent. of insoluble mineral matters, exist; whilst the fairly ripe contains $3\frac{6}{10}$ of soluble, and $2\frac{7}{10}$ of insoluble, mineral matters, and the over-ripe only $2\frac{2}{10}$ per cent. of soluble, and 4 per cent. of insoluble.

PEA-STRAW.

An excellent sample of pea-straw, grown in 1860, on analysis, gave the following results:—

General Composition.

Water	16·02
Soluble organic matter	11·28
Soluble inorganic matter	2·72
Insoluble organic matter	67·77
Insoluble mineral matter	2·21
	100·00

Detailed Composition.

Water	16·02
Oil	2·34
*Albumen and other soluble protein compounds	2·96
Sugar, mucilage, extractive matters, &c. (soluble in water)	8·32
Digestible fibre, &c.	16·74
Soluble inorganic matter	2·72
†Insoluble protein compounds	5·90
Woody fibre	42·79
Insoluble inorganic matter	2·21
	100·00

*Containing nitrogen	·474
†Containing nitrogen	·945
Total percentage of nitrogen	1·419
Equal to protein compounds	8·86
Total percentage of ash	4·93

Pea-straw on an average contains about 5 per cent. of ash. The composition of the ash has been ascertained by Hertwig, who gives it as follows:—

Potash	11·78
Soda	6·55
Lime	40·34
Magnesia	8·30
Oxide of iron	1·03
Phosphoric acid	8·26
Sulphuric acid	6·76
Silica	10·66
Chloride of sodium	6·32
	100·00

The ash of pea-straw differs mainly from the ashes of oats, wheat, or barley straw by containing much less silica, and more lime and phosphoric acid.

Pea-straw, it will be seen, is richer in oil and albuminous or flesh-forming matters than the straw of the cereal crops; and as it moreover contains less indigestible woody fibre, and when properly harvested is tender and much liked by sheep and cattle, it is much preferable as a feeding material. Good pea-straw indeed is a capital article of food for ewes at the lambing season, for it contains almost as much flesh-forming matter as meadow-hay, and, under favourable circumstances, a large proportion of sugar and mucilage. The preceding analysis agrees tolerably well with the following results, obtained in analysing a specimen of pea-straw :—

Pea-straw taken from the Farm-buildings, October 31st, 1861.

General Composition.

Water	17·40
Substances soluble in water	11·77
Substances insoluble in water	70·83
	100·00

Detailed Composition.

Water	17·40
Oil	1·57
*Albuminous compounds	6·44
Gum, sugar, and crude cellular and woody fibre	68·63
Mineral matters	5·96
	100·00
*Containing nitrogen	1·03

This specimen, it will be seen, contains less oil and nitrogenised matter than that grown in 1860, to which it is decidedly superior in feeding qualities.

On the whole pea-haulm is the most nutritious of all kinds of straw. Its superiority over bean-straw is admitted by all practical farmers; although, according to an analysis by Professor Way, bean-straw would appear greatly to surpass pea-straw, and to approximate to the value of hay, if not to surpass it.

BEAN-STRAW.

I have examined two samples of bean-straw, one grown in 1860, the other in 1861. The composition of the first was as follows:—

Composition of Bean-straw and Bean-pods.

General Composition.

			Bean-pods.
Water	19·40		19·02
Soluble organic matter	5·69	*Organic matter	73·66
Soluble inorganic matter	2·31	Inorganic matter	7·32
Insoluble organic matter	71·20		
Insoluble mineral matter	1·40		
	100·00		100·00
		*Containing nitrogen	1·05
		Equal to albuminous compounds	6·56

Detailed Composition.

Water	19·40
Oil	1·02
*{Albumen	·47
{Other soluble protein compounds	1·04
Mucilage, extractive matters, &c., soluble in water	4·18
Digestible fibre, &c.	2·75
Soluble inorganic matter	2·31
†Insoluble protein compounds	1·85
Woody fibre	65·58
Insoluble inorganic matter	1·40
	100·00
*Containing nitrogen	·243
†Containing nitrogen	·297
Total percentage of nitrogen	·540
Equal to protein compounds	3·360
Total percentage of ash	3·710

The ash of bean-straw, according to Messrs. Way and Ogston's analyses, published in the ninth volume of this Journal, contains, in 100 parts—

Silica	3·86
Phosphoric acid	7·35
Sulphuric acid	3·21
Carbonic acid	22·73
Lime	21·29
Magnesia	4·88
Peroxide of iron	·90
Potash	21·26
Soda	4·56
Chloride of sodium	9·05
Chloride of potassium	·90
	99·99

In its general character the ash of bean-straw resembles intimately that of pea-straw. Like the latter, it is rich in carbonate of lime, and it also contains a good deal of phosphoric acid and potash, and but little silica. My results differ widely from Professor Way's analysis of bean-straw, as given by Mr. Horsfall, in his Essay on Dairy-farming, where the composition of bean-straw is given as follows:—

Moisture	14·47
Albuminous matter	16·38
Oil and fatty matters	2·23
Starch and gum	31·63
Woody fibre	25·84
Mineral matters	9·45
	100·00

It will be observed among other particulars—

1. That I do not find more oil in bean than in wheat straw.

2. That the proportion of albuminous matters which I found in a very fair specimen is not quite so large as in good oat or barley straw, and that it amounts to scarcely one-fourth the quantity which Professor Way is reported to have found in bean-straw.

3. That I do not mention starch as a constituent of bean-stalks.

4. That instead of only 26 per cent. of woody fibre, as stated in Professor Way's analysis, the bean-straw analysed in my laboratory contained no less than 65½ per cent. of indigestible woody fibre.

5. The proportion of matters soluble in water is by no means large.

6. Lastly, that the crude woody fibre of the bean-straw examined by me was very little acted upon by dilute alkaline and acid liquid, and, therefore, produced but very little digestible fibre.

The second sample, on analysis, gave the following results:—

Bean-straw, taken from the Farm-buildings, October 31st, 1861.

General Composition.

Water	17·75
Substances soluble in water	6·86
Substances insoluble in water	75·39
	100·00

Detailed Composition.

Water	17·75
Oil	·41
*Albuminous compounds	5·06
Mucilage, extractive matters, and woody fibre	73·46
Mineral matters	3·32
	100·00
*Containing nitrogen	·81

This sample is somewhat richer in albuminous compounds and poorer in oil than that grown in 1860; but the differences are not great. On the other hand, both specimens agree in furnishing but a small proportion of matters soluble in water.

I would direct particular attention to the fact, clearly brought out in my investigations on straw, that the crude woody fibre (the part insoluble in water) of bean-stalks is very little acted upon by dilute caustic potash and dilute sulphuric acid; that the woody fibre of wheat-straw is more easily affected by these reagents than the bean-stalks; and that barley, or oat straw, is acted on by the same agents in a still higher degree. We cannot therefore doubt, that whilst a large proportion of the crude woody fibre of pea, barley, and especially oat straw, is assimilated by ruminating animals, bean-stalks are digested to much less extent.

As far as my own analytical results allow me to form an opinion, bean-stalks cut up by themselves into chaff, though useful as food when harvested in a good season, are decidedly inferior to any other description of straw. If I am not mistaken, these analytical results fully confirm the practical experience of the farmers in our neighbourhood, who, like most of their class, put a low estimate on the feeding value of bean-stalks. Bean-pods, it will be seen, contain a considerable proportion of albuminous compounds; they are, moreover, more tender and, no doubt, more easily digested than the hard stalks. When, therefore cattle or sheep are allowed to pick out the pods and softer portions of bean-stalks, they do very well, for these parts are much more nutritious than the lower and harder parts. The preceding analysis, it should be remembered, has been made of the whole bean-stalks without the pods.

FLAX-STRAW.

In the neighbourhood of flax-mills a refuse material, which is called "skimp," is produced in considerable quantities, which is nothing more or less than flax-straw chaff. A specimen, on analysis, furnished the following results:—

General Composition of Flax-chaff.

Water	14·60
Soluble organic matter	8·72
Soluble mineral matter	4·07
Insoluble organic matter	69·25
Insoluble mineral matter	3·36
	100·00

Detailed Composition of Flax-chaff.

Water	14·60
Oil	2·82
*Protein compounds	4·75
Sugar, gum, mucilage, &c.	8·72
Digestible fibre	18·56
Indigestible woody fibre	43·12
Soluble mineral matter	4·07
Insoluble mineral matter	3·36
	100·00
*Containing nitrogen	·76
Total percentage of ash	7·43

It will be seen that this flax-straw contained nearly 3 per cent. of oil and fatty matters, nearly 9 per cent. of substances soluble in water, and about as much albuminous matter as good barley-straw. In addition to these valuable nutritive constituents, it furnished 18½ per cent. of digestible fibre. I have, therefore, little doubt that, mixed with sliced or pulped roots, it may be advantageously given to cattle. As far as it is allowable to judge by its composition, flax-straw is more valuable as a feeding material than wheat and barley straw and bean-stalks; it ought, therefore, not be employed as litter.

CLOVER AND MEADOW-HAY.

As it may be useful for some purposes to compare the composition of straw with that of hay, I have made, in connexion with these investigations on the feeding qualities of different kinds of straw, two complete analyses of hay—one of well made clover-hay, and another of good meadow-hay, and obtained the following results:—

Composition of Clover and Meadow-hay.

General Composition.

	Clover-hay.	Meadow hay
Water	20·50	16·66
Soluble organic matter	18·07	17·79
Soluble inorganic matter	4·43	4·37
Insoluble organic matter	54·38	57·78
Insoluble mineral matter	2·62	3·40
	100·00	100·00

Detailed Composition.

Water	20·50	16·66
Oil, wax, and chlorophyle	3·59	5·01
*Albumen and other soluble protein compounds	5·00	1·81
Sugar, mucilage, extractive matters, &c., soluble in water	13·07	15·98
Digestible fibre, &c.	16·42	28·88
Soluble inorganic matter	4·43	4·37
†Insoluble protein compounds	8·75	6·25
Indigestible woody fibre	25·62	17·61
Insoluble inorganic matter	2·62	3·40
	100·00	100·00
*Containing nitrogen	·80	·29
†Containing nitrogen	1·40	1·00
Total percentage of nitrogen	2·20	1·29
Equal to protein compounds	13·75	8·06
Total ash	7·05	7·77

It appears from these analyses—

1. That hay, especially clover-hay, is much richer in albuminous or flesh-forming compounds than straw.

2. That it contains also more oil and fatty matters.

3. That both clover and meadow-hay, when well made, are much richer in sugar and other soluble matters than straw. Good meadow-hay especially contains a good deal of sugar, and is sweet to the taste.

4. That the proportion of indigestible woody fibre, particularly in meadow-hay, is much smaller than in straw; and

5. That good meadow-hay contains more digestible fibre than clover-hay.

For these reasons, both clover and meadow-hay are, as feeding substances, superior to straw.

The kinds of straw that approach in composition the nearest to hay are green oat-straw and pea-haulm.

It has been stated already that the state of maturity in which straw is harvested materially affects its composition and feeding value; likewise, that probably the climate and character of the land have great influence in producing the most nutritious kind of straw. It is, therefore, impossible to pronounce in a general way whether wheat, oat, or barley straw is the most valuable for feeding purposes. Assuming, however, the land and climate to be equally well adapted for producing the best kind of straw in each case, and the crops to have been harvested in the same stage of maturity, I am inclined to place the different kinds of straw in the following order, beginning with the most nutritious, and ending with the least valuable for feeding purposes:—

1. Pea-haulm.
2. Oat-straw.
3. Bean-straw with the pods.
4. Barley-straw.
5. Wheat-straw.
6. Bean-stalks without the pods.

Royal Agricultural College, Cirencester, Dec. 1861.

XVIII.—*Statistics of Live Stock and Dead Meat for Consumption in the Metropolis.* By ROBERT HERBERT.

THE metropolitan market has been well supplied with beasts during the last six months, and the quality of most breeds has exhibited a decided improvement; the beef trade has continued in a healthy state, and prices have ruled remarkably steady. That the past has been a favourable season for the production of stock is evident from the condition in which the beasts have come to hand. The most important feature in the supplies has been the unusually large number of crosses which week by week have made their appearance. Not that there has been any falling off in the pure breeds, but that the increase in our enormous consumption has, in a great measure, been met by cross-breeds well suited to first-class consumption, or indeed quite equal in quality to the best Scots. Doubtless the comparatively high prices at which beasts have been disposed of during the last two or three years have stimulated production generally in the United Kingdom; still it is gratifying to find that, although the policy of cross-breeding has been much contested, it has proved highly remunerative to the grazier, and placed the country in a much improved position as regards a full average supply of really consumable meat, without justifying the apprehensions of those who were jealous for the maintenance of the pure breeds. We find the system at present chiefly carried on in Scotland, Norfolk, Suffolk, and in some parts of Lincolnshire.

The market has of late exhibited another important feature, from the fact that nearly a moiety of the stock exhibited was composed of beasts under two years old. Though young they have "died" well; they have produced high currencies; and, from their large proportion of prime meat, assisted butchers in carrying on their business at a profit: otherwise the best joints of meat would, no doubt, have realized great prices; inferior cuttings must have sold at a loss from want of an adequate number of customers for them. The science of breeding, then, has now fully developed itself to the benefit of the country; the farmer seeing that three bullocks are now produced, where under the old principles only one was sent to market. Although losses from pleuro-pneumonia have still been sustained, it is satisfactory to learn that this disease has been less fatal of late than on the ordinary run of years.

The supplies of mutton have not been equally satisfactory. Although there has been a large arrival of sheep from the Continent, prices of all breeds have ruled high, and their general quality has proved inferior; indeed we believe that at least two-thirds of the sheep disposed of since June last have been below the average condition. To what cause are we to attribute this scarcity? To an extension of the in-and-in system of breeding, or to the disastrous effects of the wet, cold season of 1860 telling upon the following year? From whatever cause the deficiency may have arisen, it is clear that nothing short of large arrivals from Holland and elsewhere will keep the currencies at their present range. It is true that young sheep have come pretty freely to hand, but from the small quantity of internal fat carried by them they have mostly sold at considerably less money than stock from two-and-a-half to three years old; hence it may be doubted whether sheep-feeding has paid well except in favoured districts, and where the best breeds are chiefly produced. The rapid progress of sheep-breeding abroad has created no little surprise in this country. In 1861 the imports into London alone amounted to 44,236 beasts and 235,910 sheep. The quality of the beasts has exhibited very little improvement when compared with most previous years; but the sheep have for the most part come to hand in excellent condition; in fact it must be admitted that they now carry more fat than our long-woolled breeds, and that they have become great favourites with the buyers. These observations, however, do not apply to the original long-legged Dutch breeds, which have almost wholly disappeared from our markets. The stock now received from Holland shows unmistakeable signs of crossing with our pure Downs. The legs have been considerably shortened, the fleece hangs well, and the prices realised are very high. In no country in the world has so wonderful an improvement taken place in so short a period in the quality of sheep as in Holland. The Dutch calves have, too, turned out remarkably well, but the lambs and pigs, from what may be called their poor condition, have changed hands at low currencies. From Germany, *viâ* Hamburg, the import of sheep has been large as to number, but of a quality only suited to low consumption. It is surprising that the graziers in Germany should continue to forward stock worth only from 18*l.* to

25*l.* each, which returns little or no profit to them; in point of fact, after allowing for freight, charges, and commission, it may be doubted whether merino breeding is not productive of a loss.

The annexed statement shows the number of each kind of stock, including foreign arrivals, disposed of in the Great Metropolitan Cattle Market during the last six months of each year:—

Supplies of each kind of Stock Exhibited and Sold during the last Six Months of the following Years:—

	1856.	**1857.**	**1858.**	**1859.**	**1860.**	**1861.**
Beasts	129,509	137,915	147,118	143,198	145,420	149,750
Cows	2,864	2,918	3,137	3,030	3,015	3,187
Sheep and Lambs	689,444	701,414	747,829	803,334	762,740	774,260
Calves . ..	14,480	15,006	15,186	12,277	15,766	12,441
Pigs. ..	18,733	14,992	19,441	16,130	15,470	20,116

The above comparison exhibits a steady increase in the supplies of both beasts and sheep in 1861, compared with 1860; compared with 1856 the excess is most important. Pigs have steadily increased in number, but the supply of calves has fallen off owing to the unusually small numbers of English on offer. Whilst the foreign competition keeps down the price of veal, English breeders will find it more profitable to keep their calves to be turned into prime beef.

In glancing at those quarters from whence London draws its supplies, we find a steady increase in the arrivals from Lincolnshire, Leicestershire, and Northamptonshire; but a falling off in those from Norfolk, Suffolk, Essex, and Cambridgeshire. Other parts of England have forwarded very moderate supplies, but from Ireland and Scotland they have steadily increased. About 6000 fewer foreign beasts have been on offer than in 1860, but the supply, taken as a whole, has come up to some former years. The district arrival statement is as under:—

"District" Bullock Supplies.

	1856.	**1857.**	**1858.**	**1859.**	**1860.**	**1861.**
Northern Districts ..	60,760	81,600	66,260	64,470	66,140	71,450
Eastern Districts .	.	7,000	6,970	[illegible],600	9,500	2,500
Other parts of England	20,700	15,370	13,820	23,220	20,500	9,700
Scotland	2,734	1,836	2,674	4,640	1,151	4,586
Ireland	11,000	12,000	13,760	10,544	7,852	10,340
Foreign	33,381	25,984	30,797	30,394	37,573	31,814

The Irish stock has mostly appeared in fair condition, and some really well made up sheep have arrived, and fetched good prices. The great improvement in the quality of the bullock supplies has had the effect of reducing the value of the best breeds when compared with 1860. In the value of mutton very little change has taken place, as the annexed statement will show:—

Average Prices of Beef and Mutton.

	1856.		1857.		1858.		1859.		1860.		1861.	
Beef:—	s.	d.	s.	d.	s.	d.	s.	d.		d.	s.	d.
Inferior ..	3	0	2	10	2	10	2	10	2	8	3	0
Middling	4	0	3	10	4	0	4	0	1	0	4	0
Prime .	5	2	4	10	5	2	5	2	5	4	5	0
Mutton:—												
Inferior .	3	4	3	0	2	10	3	0	3	2	3	2
Middling	4	2	4	2	4	0	4	2	4	6	4	6
Prime	5	4	5	4	5	2	5	2	5	10	5	8

Increased quantities of Scotch and country-killed meat have been on sale in Newgate and Leadenhall, and some rather large parcels of mutton have come to hand from Holland. Prices have continued to fluctuate, but generally a large business has been transacted.

In conclusion, we may observe that the Norfolk season for both beasts and sheep has opened remarkably well. The arrivals from that quarter have been in excellent condition, and we understand that the number of stock ready for sale is much larger than in the general run of years.

5, *Argyle Square, St. Pancras, London.*

XIX.—*Laying down Land to Permanent Pasture.* By M. H. Sutton.

Preparation of the Land.—If the land is not clean, it is well to take a crop of turnip or other roots previous to laying down grass, which will afford opportunity for more effectual cleaning than can be done in the winter months preceding the seed-sowing.

The importance of getting the land into a good tilth, fine, firm, and level, cannot be overstated, as, if the land is rough or hollow, some seeds will be too deeply buried, and others not covered at all. If the field is full of weed-seeds, they will germinate more quickly than the grasses, and take possession of the land.

Manure.—If a root-crop has been *fed off* in the previous autumn, it will generally be unnecessary to apply other manure; but if the land requires assistance, a top-dressing of 2 cwt. per acre of Peruvian guano, or the same quantity of nitrate of soda, should be applied when the grass is well established, say 2 inches high.

Sowing.—Choose a still day, as a rough wind would prevent the regular spreading of the seeds. Some men who are used to it will sow grass-seeds well by the hand; but it will generally be done better with the common seed-barrow. This will distribute the seed very evenly, either in one mixture of clovers and grass-seeds together, or (which is most usual) by going twice over the land, sowing the light grass-seeds first, passing up or down the furrows, and subsequently crossing the lands with the mixture of clovers and other heavy seeds.

A bush-harrow, or the lightest iron harrow, should be applied immediately before and after sowing, thereby covering the seeds before birds or a change of weather can interfere with them, care being taken that as few seeds as possible are buried too deeply, or remain uncovered. After harrowing, the whole should be carefully rolled. As to the best *season* for sowing, though much has been written in favour of autumn-sowing, we have no hesitation in saying that the spring is preferable if the land can be made ready. With very heavy land, however, in a wet spring, it is often late in the summer before it is sufficiently pulverised, and if later than the middle of June, it is well to defer the sowing till August or September; but in autumn-sowing there is great probability of losing the clovers, as, while in a young state, they are apt to be carried off by slug or frost. Therefore, if autumn-sowing is adopted, it is well to examine the young pasture early in the spring, and, if the clovers are found to be deficient, to sow more of the same kinds immediately, which will take very well if the grasses are not too strong.

By spring-sowing we mean sowing during the months of March, April, and May; and, generally, April will be the safest and most favourable month of the three. If, however, the land is quite ready by the middle of March, and the weather favourable, it would be good policy to sow without delay, rather than incur the risk of the seed-bed being spoiled by a change of weather. If it is desired to grow a crop of corn, the time of sowing the grass-seeds will be either immediately after the corn, or else when the corn is two inches high—the former being most favourable for the grass. As to the question whether it is best to sow with or without a crop of spring corn, it is no doubt safest and best to sow the grass-seed alone, especially where the object is to obtain a fine park-like sward as soon as possible. One great advantage of this practice is, that if the land has not been thoroughly cleaned, and the annual weeds get ahead of the rough grass, they may be destroyed by mowing as soon as the grass is six inches high; and another is, that if from irregular sowing, or from the roller not having passed over every part of the field, some bare spots occur, they may be discovered and re-sown in good time.

In sowing corn with the grass-seeds some of the finer kinds of grasses are almost sure to fail, especially if the corn crop is heavy and becomes lodged. Still much might be said, and is said, in favour of this latter practice; and, seeing that the obtaining a crop of oats or barley is an important matter with most farmers, we would by no means condemn the practice, especially as the seedsman can, if duly informed of the intention of his customer, provide such sorts and proportions of grass and clover-seeds as will, under ordinary circumstances, insure a full plant. The quantity of corn sown should not be more than 2 bushels per acre, and oats are generally less injurious to grass than barley.

Sowing Grass-seeds with Wheat.—It not unfrequently happens that a field already sown with wheat is desired for adding to the grass-lands; and if it is pretty clean, there is no objection or difficulty in effecting this, provided the seeds are sown sufficiently early before the wheat is too high. Upon autumn-sown wheat the grass-seeds might be sown as early as the middle of February, if the weather be open, as the wheat will defend the young grass from any injury by frost; but if the wheat is very backward, or stands thin on the ground, the sowing may with advantage be deferred.

On spring-sown wheats the grass-seeds should be sown as soon as the corn is 2 or 3 inches high; and as all the tillage required will be bush-harrowing before sowing, and rolling afterwards, no injury to the wheat-plant need be feared.

The most suitable Weather for Sowing Grass-seeds.—Choose a fine day when the land is tolerably dry, but when there are indications of approaching rain. These are much more favourable conditions for the seeds to fall on the land than rainy or showery weather, as they are more likely to be evenly covered, and will be very gradually absorbing moisture from the soil previous to the fall of rain, which they will be in a condition to receive with benefit; whereas, if sown *after* a shower, as is too frequently done, these advantages are not obtained, but after the seeds have become saturated with moisture, the dry weather returns, and they become "malted."

The sorts of Grasses and Clovers most suitable for Permanent Pasture.—This is perhaps the most important point of all in laying down land. The natural grasses vary exceedingly as to their suitability for the many different kinds of soils and situations for which they may be required; and when we are informed of these particulars concerning the land, and the number of acres to be laid down, we apportion the sorts accordingly. We are, however, often applied to for advice as to *what sorts* we recommend; and as we wish to make no secret or mystery of what our mixtures of permanent grass-seeds consist of, we here present a list of what we consider the best possible mixture for a good medium soil, neither too heavy nor too light, *i. e.* good turnip and barley land. These are all of excellent properties; and, coming to maturity at different seasons of the year, are found to produce a permanent and evergreen sward: —

	lbs.		lbs.
Alopecurus pratensis	1	Lolium perenne tenue	4
Anthoxanthum odoratum . ..	½	Phleum pratense	1
Cynosurus cristatus	1	Poa pratense	1
Dactylis glomerata .. .	2	„ trivialis	1
Festuca duriuscula	4	„ nemoralis	1
pratensis	4	Medicago lupulina	1
ovina		Trifolium repens (White clover)	4
rubra		„ „ perenne	4
tenuifolia		„ pratense perenne ..	1
loliacea		„ hybridum (Alsike) ..	2
Lolium perenne sempervirens ..			

The sorts and proportions of the seeds used will be different from those above stated on particular soils, and also on those pastures which are devoted to special purposes.

Nothing can be more injudicious than sowing "hay seeds," as they are called, which are collected in the hay-loft, as they consist principally of *Holcus* and *Bromus*, the only grasses which are ripe at the time grass is cut for hay, and some other weeds which are not grasses at all.

After-Management.—Soon after the young plants are established—say 3 to 4 inches high—a roller should be drawn over the field, and if any spots are found in which the seeds have missed, more should be sown.

As weeds indigenous to the soil are almost sure to come up in land laid down to grass, care should be taken to remove them by the hand, or check them by early mowing.

These operations of course cannot well be performed if a crop of corn has been sown with the grasses; but in such case the grasses and clovers should be looked to immediately after the corn is carried, some additional seeds sown in any parts in which the grasses have suffered from the corn-crop, when a top-dressing of well-rotted farmyard manure may with advantage be applied. Rolling once or twice before Christmas will be beneficial; and, should the grass become very strong before winter, cattle may be turned in during fine weather; but on no account sheep, as they are apt to pull up the young plants of grass.

It will generally be better to leave the pasture till spring, giving it an additional rolling or bush-harrowing in the month of March, with a top-dressing of manure, if considered necessary. The young grass should not be *grazed* till the following autumn; but two crops of hay should be taken in the first season—the first as early as possible. This frequent cutting checks the stronger grasses, and affords the more slender-growing kinds a better chance, and all are encouraged to tiller out and form a good close sward; whereas, if allowed to stand too long before mowing, the early kinds would become strong and ripe to the injury of others.

Again, if cattle are allowed to graze after the first mowing (or instead of mowing), they will pick out certain grasses and clovers, leaving others which in time become more coarse than is desirable, and have a very unsightly, patchy appearance.

If grazing is practised, as being more in accordance with the requirements of the owner, then a scythe should be applied once or twice during the first summer to those plots of grass which the cattle leave.

Breaking up of Grass-land.—Some old pastures are so unproductive, and so foul with weeds, that it is desirable to break them up, grow a crop of turnips, and then sow seeds for permanent pasture. The subsequent crops of grass will be incomparably better than were obtained previous to breaking up. Paring, burning, and spreading the ashes for manure is an excellent plan, and very superior to ploughing the turf in. The expense of this operation will soon be repaid ten-fold by the increased crops of hay and pasturage. About the beginning of March is the best time to begin the paring; and as to the burning, no time should be lost when dry, so as to get the land ready for turnip-sowing.

Improvement of Grass-lands.—Thousands of meadows and upland pastures are producing less than half the quantity of hay and feed which the land is capable of, from a deficiency of plants of those kinds which are most productive and most suitable for the soil. In some cases, where the pasture is very foul with weeds and moss, it is advisable to pare and burn the old sward, and resow the land entirely, as above directed. In some other instances it may be desirable to drain and manure the land; but in most cases great improvement can be effected by merely sowing renovating-seeds (which should consist of the finest and most nutritive kinds of perennial grasses and clovers) in the following manner. Heavy harrows should be drawn over the old turf early in the spring to loosen the soil for the admission of seeds, which, if sown freely, will occupy the numerous small spaces between the grasses already growing, and supersede the coarse grasses and noxious weeds.

It is a good practice to sow these seeds at the same time as the top-dressing, if any is applied; but this is by no means necessary. The months of February, March, and April are proper for sowing the seeds; the earlier the better, as the old grass will protect the young from frost. It is also useful to sow in July and August, immediately after carrying the hay. Should the old turf be very full of moss, this is generally an indication that draining would be beneficial. The following is, however, an almost infallible remedy for the moss, not only destroying it, but preventing the growth in future. Mix two cartloads of quick-lime with eight cartloads of good light loam, turning the compost several times that it may be thoroughly mixed and the lime slaked, and spread *this quantity per acre* over the pasture, dragging the turf well with iron harrows. Cattle should not be allowed to graze at the same season as this dressing is given, or at least not till after one crop of hay has been taken.

We offer the foregoing hints, on laying down permanent pastures, &c., founded on our own experience and observation during full thirty years, under the various circumstances and upon the different soils which prevail in this country; and we flatter ourselves that, if they are acted upon pretty generally, considerable improvement will be observed in this important department of agriculture.

Reading, Berks, January, 1862.

XX.—*The Water Economy of France in its relation to Agriculture.*

By F. R. DE LA TRÉHONNAIS.

AT a time when the attention of the legislature of the country has been directed towards measures calculated to substitute a general and comprehensive system of drainage for the isolated and hampered attempts to which, by the inadequacy of the English law, agriculture was previously restricted, a glance at the water economy of France, especially as regards its legal regulations, may not be inopportune.

However enticing the development of this subject may be, it will be my study in the following pages to treat it as succinctly as possible, and exclusively in an English point of view. No ambitious attempt will be made to grapple with the general question of the water economy of so vast a country as France, but rather from the scenes most familiar to me, and the information at my command, to select such points of view as by comparison and illustration may best throw a light on the English aspect of this important subject. Until last year the statutes of England almost ignored the subject of water-supply—the regulation of the ingress and egress of water—and it will hardly be anticipated that a single enactment will have exhausted this large question. France, on the other hand, enjoys on this head the most complete, well-defined, and equitable code of any country in Europe; but, unhappily, few nations have made fewer efforts to turn these advantages to good account.

Whilst in England the water-meadows of the south-western counties, and the great enterprises for reclaiming the Fens in the east (effected by *special* enactments), and the general rapid development of field-drainage, attest the practical energy of the country, in France the voice of lamentation is constantly heard,—either from the southern and central provinces, complaining of drought which not unfrequently assumes the proportions of a scourge,—or, on the other hand, from the valleys of many streams, and the whole of the mountain districts, where inundations spread disaster and devastation along the wide and shifting channels of the rivers.

To an agriculturist travelling in France it is, then, painfully evident that no adequate efforts are made in arid districts to husband the moisture; or again, where the rain is at times excessive, to provide sufficient outlet for the floods, or form reservoirs where the water may be kept for irrigation against the day of scorching heat. And yet, as will presently appear, the laws of France singularly facilitate the management of water, whilst the Government offers the gratuitous services of an able staff of engineers, scattered over the whole country, to assist the owners of the soil in controlling this most powerful agent for good or evil.

I. *The Running Waters of France.*

Of the rain that falls, that portion which is neither retained by the soil, directly evaporated, or absorbed by the functions of vegetable life, either flows over the surface, or bursts out in springs, taking a direction which varies according to the contour or lie of the country, and then, through a succession of rills, rivulets, streams, and rivers, makes its passage to the sea. There is no more convenient or instructive method of subdividing a country than into water-basins, or areas within which these channels converge; many most interesting topographical and geological features will thus be brought to view, the varieties of climate and natural productions defined, and even the difference in the chemical properties of water will be shown to exert an influence on agriculture capable of further extension.

France lends herself easily to such a distribution. She is bounded on the north-east by the Northern Ocean, on the north-west by the English Channel, on the west by the Atlantic, and on the south by the Mediterranean; and hence four great hydrographical divisions may be formed.

As the same chain of hills for many leagues often forms the common barrier between two adjacent basins, to avoid repetition and ensure perspicuity, it is desirable to give a combined view of the general outline of all these divisions.

Of the north-eastern basin but a small portion falls within French territory; the barrier which separates it from the north-western division begins at Cape Grisnez, opposite Dover, and runs along eastward, near the frontier of Belgium, till it has reached the eastern side of Champagne, where it turns towards the south and forms the eastern boundary of that province; but before it has reached its southern limit the chain divides and forms a fork, from which the head-waters of the Mediterranean basin issue forth. The eastern prong, forming the watershed between the latter basin and the north-eastern, bends to the east, until it has joined the mountains of Alsace, and then running to the south, forms the long and magnificent range of the Jura, which culminates over the town of Gex, not far from Geneva.

The north-western basin is bounded on the north by the mountain-range which stretches from Cape Grisnez to the fork already described, from whence, passing the lofty plateau of Langres, this western prong is continued southwards beyond Dijon, when the barrier turns suddenly to the west by Château Chinon, and thence returns in a continuous north-westerly direction through several provinces of Central France, north of Orleans, to Alençon, and so through the west of Normandy, rejoining the Channel near Cherbourg.

The western or oceanic division comprehends two noble rivers: the Loire and the Garonne, and will best be subdivided into the northern, or basin of the Loire, and the southern, or that of the Garonne.

The basin of the Loire, which, in the extreme west, has for its northern barrier the granitic mountains of Brittany, is conterminous with the north-western division from Alençon to Château Chinon and the hills of Burgundy, whence a high range, running down to the south beyond Lyons and Valence, divides it from the valley of the Rhone; and here the watershed makes a circuit to the west amongst the interesting volcanic mountains of Auvergne, from whence a lower range of hills, traversing the provinces of Limousin and Poitou, returns in a north-westerly direction, till it reaches the sea just below the mouth of the Loire, in the extreme south of Brittany.

The southern oceanic basin, or that of the Garonne, has for its northern barrier this last-named chain from the sea to the mountains of Auvergne. From thence its eastern boundary is formed by the chain of the Cevennes, which run towards the south-west until they reach the Pyrenees, and these great frontier mountains continue the circuit westward to the Bay of Biscay.

Of the Mediterranean basin the western watershed has been already traced. Commencing from the north, near Langres, it consisted first, of the Burgundian hills (the boundary of the north-western basin), next of the chain running to the south of Lyons, the eastern boundary of the Loire basin; and lastly, of the Cevennes, till they join the eastern Pyrenees on the skirts of the Mediterranean. Its eastern barrier is identical with that of the north-eastern division, from its apex southwards to Gex, above Geneva; and from thence following the contour of the Lake of Geneva by Neufchâtel and Lausanne, it penetrates deeply into the very heart of the southern slopes of the Bernese Alps and the Great St. Bernard, as far as the very source of its main artery, the swift and mighty Rhone. It then follows the snow-capped summit of the whole range of the Alps from Great St. Bernard, Mont Blanc, and the Cottian chain, down to their very base, bathed by the blue waves of the Mediterranean at Nice.

This outline, which purposely avoids the mention of places unknown to foreign readers, will, it is hoped, be found fairly accurate and intelligible. It will at least bring out one point of hydrographical interest, viz., the great degree of fusion and approximation which water-channels produce between the north and the south, the east and west. From what a northerly source are those head-waters derived which run into the Mediterranean! What a tale the streams of the Loire might tell to Central France and the bleak shores of the Atlantic, of the sunny regions where first they saw the light!

Of the rivers which traverse the north-eastern basin the most important is the Rhine, which noble stream, however, is hardly French, flowing as it does along, or external to, the French frontier. On the upper part of its course a few insignificant streams from the eastern declivities of the Vosges supply its only tribute of French waters, except those which the Moselle gathers, in the upper part of its course, from the Meurthe and the Sarre.

The Meuse, from its source down to the schistose formation of the Ardennes, runs through a valley scooped out of the middle oolite, and receives at Namur the tribute of the Sambre, a river having nothing French but its source.

The Scheldt, like its two affluents, the Scarpe and the Lys, arises from the great chalk range which terminates at Cape Grisnez, and runs in a south-eastern direction into the basin of the Meuse, to which it might be easily joined. The highly prosperous and advanced state of agriculture in the provinces, such as Lorraine, Alsace, Flanders, which these rivers traverse, gives to this French division, small though it be, a characteristic importance which more than compensates for its comparative geographical insignificance.

Of the north-western basin the chief river is the Seine. Most travellers by the Paris and Lyons Railway may remember the steep incline which begins at Montbard and culminates at the station of Blaisy Bas. The bleak crags and mountain-tops which crown this wild valley form part of the boundary-line between the north-western basin and that of the Mediterranean. In that neighbourhood the beautiful Seine gushes forth from a cleft in the hills, whilst many other of its tributary streams spring from various points of the immense amphitheatre of Jurassic mountains, which forms as it were the eastern apse of this elongated enclosure. From its source, near Dijon, to its mouth at Havre, the Seine runs a course of no less than 600 miles through this immense parallelogram; its principal tributaries are the Oise, the Aube, the Yonne, the Marne, and the Eure. The area drained by the Seine may be computed at nearly twenty million acres. The mean annual rainfall upon that area has been calculated at 22,933 millions of cubic mètres, or 3,045,260 million gallons. Some efforts have been made to gauge the quantity of water flowing through the channel of the Seine at various parts, in order to calculate what proportion it bore to the amount of the annual average rainfall. The following figures have been accurately ascertained by the interesting experiments of M. Dausse:—When the stream is at its lowest point the quantity of water passing beneath the bridge of La Concorde, at Paris, is 75 cubic mètres, or 16,500 gallons, per second; when the stream is not unusually low it is 111 cubic mètres; or 24,420 gallons; at its mean height it is 246 cubic mètres, or 54,120 gallons; and in times of great influx, when the river is on the verge of overflowing its banks, the amount rises to 1141 cubic mètres, or 251,020 gallons. In the year 1615, 1400 cubic mètres, or 308,000 gallons were registered. From the most trustworthy calculations it may be inferred that only one-fourth of the rain falling upon the area of the Seine basin finds its way to the sea through that channel, the other three-fourths being otherwise absorbed. These records apply to an area essentially undrained. It would be interesting to be in a position to compare them with similar experiments made upon streams which receive the waters of a well-drained district.

The western or oceanic division comprises by far the most extensive area. It extends over two-thirds of the whole surface of France, and consequently drains no less than 88 million acres.

The central group of mountains in Auvergne, so strikingly overtopped by the three great volcanic summits of Mont d'Or, Cantal, and Mèsenc, send forth from their granitic bases the feeders alike of the northern basin of the Loire, and the southern basin of the Garonne. From the northern declivity, each in its own deep and well-defined valley, flow the Loire and the Allier on the northern route; and from the southern slope the Dordogne hastens to pay its tribute to the Garonne. We have also on the north side the Cher, the Indre, the Creuse, the Vienne, tributaries of the Loire; from the southern declivity flow the Drôme, the Isle, and the Vezère, which fall into the Garonne; and from the point where the granitic and crystalline mass disappears beneath the stratified layers from whence it burst forth, the Tarn and the Lot spring up to swell the waters of the Garonne.

Thus Auvergne is the cradle of all the great rivers which discharge their waters into the Atlantic Ocean, with the exception of the Garonne, which, together with its southern tributary, the Arriège, is of Pyrenean origin. The Arriège may even be considered as a branch of the Garonne rather than a distinct river, as it forms with the upper part or torrential stream of that great river a huge triangle, the base of which is formed by the highest range of the Pyrenees, from Puycerda to Bagnères de Luchon. East of that extreme lofty range flow the waters of the river Tet towards Perpignan, thus forming with the other mountain-stream the Tech the small western section of the Mediterranean basin, in the same manner as the Adour and the drainage-water from the western slopes of the Pyrenean range form the extreme southern secondary basin of the oceanic division.

All those tributary streams that belong to the Loire basin, as well as those belonging to that of the Garonne, flow through secondary strata of the oolite or chalk formation before their confluence with the main streams into which they merge, which flow in tertiary or alluvial strata.

Below the city of Angers the Loire is joined from the north by the Maine, which is itself formed by the confluence of three rivers, the Loir, the Sarthe, and the Mayenne. Lower down it receives the Vilaine, the Aune, and the Blavet, which bring the waters from the Breton peninsula.

Between the mouth of the Loire and that of the Gironde—a name given to the stream formed by the junction of the Dordogne and the Garonne, just below Bordeaux—the space intervening is drained by two rivers which empty their waters directly into the ocean: the Sèvre, which flows almost exclusively through Jurassic strata; and the Charente which waters districts chiefly belonging to the lower chalk formation. These two rivers converge at their outlet into the sea, opposite the Isle of Rhé. Finally, in the extreme south the river Adour, flowing from the western extremity of the Pyrenean chain, empties its waters into the Bay of Biscay at Bayonne, close to the Spanish seaboard.

The whole length of the river Loire exceeds 800 miles. It drains at least one-fourth of the whole surface of French territory. Its sudden freaks and terrific overflowings are too well known to need more than a passing notice.* I shall refer in a subsequent paragraph to the nature of its waters and that of its principal affluents.

The Gironde, together with its two great affluents, the Dordogne and the Garonne, drain an area of at least twelve million acres.

The river Rhone is, so to speak, the only channel through which all the waters of the immense Mediterranean basin are conveyed into the sea. I have already described the boundaries of that extraordinary water division, so boldly and so strikingly delineated by the lofty range of mountains which surround it on all sides, from the eastern extremity of the Pyrenees to the southern buttresses of the Alps on the western limit of the Gulf of Genoa.

The river Rhone takes its source in one of the glaciers of the Saas Mountains west of St. Gothard, at an altitude of nearly 6000 feet above the level of its mouths. The length of its course, including its passage through the Lake of Geneva, from which it gushes forth purified and refreshed like a mighty giant, is no less than 600 miles. Its principal affluents are the Arve, just below Geneva, which brings all the water from the western slopes of the Savoisian Alps, from the heights of Mont Blanc, and the river Ain, which drains the whole of the ancient province of Bresse. At Lyons the Rhone enters the valley of the placid but treacherous Saône. Lower down the Isère brings down the waters collected from the deep valleys of Maurienne up to the Mont Cenis, and then gathers those of the Cottian Alps as it traverses the luxuriant valley of Graisivaudan, by Grenoble, and the Grande Chartreuse. Last in order come the Drome and the unruly Durance.

The noble Rhone is then the main, if not the only, outlet of the waters of the Mediterranean basin; and, together with the Saône, which can hardly be termed its affluent, is the characteristic feature of the whole division. Nothing can be more striking than the contrast presented by these rivers: the one owing its origin to, and being fed by, torrential affluents, preserves throughout the whole of its course a rapid current, an unsettled flow, and a bluish turgidity, which at once reveal its mountain birth and connexion; the other, the tranquil Saône, having its source amongst low hills, and pursuing its sluggish course through a wide expanse of level plains, slowly moves, as if loth to leave its grassy banks, until it encounters the swift Rhone, and is hurried along together with the fretful current of its mighty invader. It is worthy of special remark that the overflow of these two rivers, arising in each case from a different, if not an antagonistic cause, never occurs at the same time—a providential circumstance for the great city, below which they meet. The waters of the Saône and of its principal affluents are directly affected by the rainfall; those of the Rhone and all its mountain tributaries, on the contrary, are furnished by the sudden melting of the snow that caps the mountain-tops, the result of sunshine and genial temperature; so that in winter the Rhone is at its lowest ebb and the Saône at its fullest tide, whilst in summer the contrary takes place.

II. *The Geology and the Chemistry of the Running Waters of France.*

We now come to a branch of hydrography most important to agriculture, although it has been hitherto much overlooked. At a time when the happy results of irrigation are so generally recognised, and so many efforts are being made to utilize the available streams that flow within the reach of waste lands and barren hillsides, it is obviously important to investigate by chemical research the characteristic constituents of our rivers. It is with this view that I will now introduce in a condensed form the interesting results of the investigations made in that direction by French *savants* in regard to the principal rivers of France.

The physical condition of water, whether it be rain, spring, or river water, is by no means homogeneous, but varies a great deal, according to the very many local and diversified circumstances presented by the surface of the globe. Even with respect to the laws which regulate the supply of rain, though some influences, such as proximity to the sea or to mountain chains, have been recognised and explained, still other peculiarities, though remarked, remain among nature's mysteries. It has been demonstrated to satisfaction on the other hand, that of two rain-gauges placed in the same district, but at different elevations, the lower gauge registers more rain than the upper one. That the mean temperature of a district, the intensity of solar action, the physical constitution of the soil, as well as its state of cultivation, exercise a most powerful influence on the distribution and ultimate appropriation of rain-water is evident; but the modes and limits of their action are still to be determined, and when this is done a great service will have been rendered to agriculture. However, it is but just to say that French *savants*, stimulated by the initiative of the Government, who have at their command an admirably organised body of engineers, under the name of the *Administration des Ponts et Chaussées*, have gone far towards the final elucidation of many important hydrological phenomena presented by the various streams of the French territory. The records of these interesting researches have lately been collected into a volume, called the 'Annuaire des Eaux de la France,' published by the French Government, a copy of which has been kindly lent me by the Department of Agriculture, to which I am further indebted for many other valuable works not easily obtained from any other sources.

Rain-water, when collected just before its contact with the surface of the soil, and therefore before its nature can be modified by the solution of any earthy substances, has been found to contain, in various proportions, some gaseous acids, such as azotic acid, free or combined with ammonia, nitric acid, and even traces of iodine, which account for its powerful action on growing crops, especially after a thunder-shower. But it is principally after its contact with the soil in its passage through soluble geological strata, that its physical nature undergoes the most conspicuous changes.

The physical nature of the waters of a river will greatly depend on that of the geological strata with which its source and that of its affluent tributaries are in contact; I say its own source, because it is found that all large rivers, for a considerable distance before they reach the sea, run in channels scooped out of tertiary alluvial deposits, the nature of which is identical with that of the alluvial earthy matters brought by the affluent streams, and deposited in the main channel by precipitation. But in the case of long rivers, the nature of the strata washed by the tributary streams often varies exceedingly; hence the complex constitution of the silt of many rivers in the lower reaches of their course: but as the chemical condition of the tributary streams is generally homogeneous, and consequently forms a characteristic feature of its water, it is interesting to note the change that the waters of the main stream undergo after they have received the tribute of their principal affluents. Thus it is found in the basin of the Seine that the waters from the crystalline soil of the Department of Yonne, conveyed to the Seine through the river Yonne, contain a notable quantity of alkaline silicates; whilst those of Arceuil are essentially calcareous, and those flowing through the gypsum strata of Belleville and Menilmontant, in the neighbourhood of Paris, are strongly impregnated with sulphate of lime. But many of these mineral substances are not soluble in pure water, and therefore it is evident that the water must contain some dissolving agent which acts upon the various strata, and allows it to carry away in its course a portion of the substances over which they flow. This agent is found to be chiefly carbonic acid; and it is to the presence of a large quantity of that acid in water flowing through calcareous strata, that such water possesses the property of incrustation, choking the pipes through which it may flow, dripping into fantastical stalactites in limestone caves, and coating every object with which it is brought in contact with a covering of solid stony matter. Other waters are known to deposit a kind of ferruginous coating when in contact with iron, and completely choke the pipes through which they are made to flow. There are other substances which impart peculiar medicinal virtues to mineral waters, which are well known, but foreign to the objects of this paper.

No circumstance in the course of a river influences more the physical nature of its waters, than its passage through a large city. The amount of sewerage it receives must not only add to its constituents a vast amount of new organic elements, but these new ingredients must produce, and themselves undergo various chemical changes on being brought into contact with other substances already contained in the stream. Some very interesting researches have been made in France on this important subject, particularly by MM. Boutron and Henry, in respect to the river Seine above and below Paris; and by MM. Girardin and Preisser, on the precipitation of the mineral salts held by the water of rivers at various points of their courses, and upon the causes by which such precipitations are determined. But before I come to these interesting details I will briefly describe the geological characteristics of the four great water divisions of France, taking the divisions in the order in which I have noticed them.

In the north-eastern basin the small French tributary streams of the Scheldt, the Scarpe, which passes through Arras and Douai, and the Lys, which flows at a short distance from Lille, may be dismissed with the remark that they both come from the chalk protuberance, which begins at Cape Grisnez, and, after having reached the base of that formation, flow over the nearly level tertiary deposits and alluvial plains of remarkable fertility, which form the French Flanders.

The river Meuse calls for more distinct notice. This river takes its source from the south-western angle of the Vosges, near the Langres plateau, and flows as far as Mezières in a valley scooped out of the oolitic formation. It runs first in a north-western direction, then suddenly bends to the north, and reaches the schistose and coal-measure formations of Hainault and Ardennes. From Maëstricht to the sea, it flows over tertiary deposits.

Of the north-west or Seine basin, the central portion is well defined, and has received the name of the tertiary Parisian basin. It is surrounded by a remarkably regular barrier of Jurassic hills, whose strata, uniformly outcropping each other in an eccentric direction, encircle concentrically the various strata of the cretacean formation. In the west, its limits are formed by the elevated and uniform plateau of Beauce, which divides it from the basin of the Loire.

Among the principal affluents of the Seine on its right bank, the Aube, like the Marne and the Meuse, springs from the Jurassic plateau of Langres; the Marne, in a course of about 330 miles, runs from its source to St. Dizier through the Jurassic formation, from St. Dizier to Epernay through the greensand and chalk; and finally through tertiary strata down to its confluence with the Seine at Charenton. The Oise chiefly derives its supplies from the Jurassic plateaux. On the left bank, the Yonne has its source in the porphyritic and granite heights of Morvan, and brings the waters from those primitive formations; and lastly, the Eure flows from the calcareous plateaux of Beauce. Thus it will be seen that, with the exception of the Yonne, the Seine itself and all its tributary streams flow over calcareous strata.

The importance of the river Seine to so large a population as that of Paris, has naturally drawn the greatest attention of chemists to the nature of its waters and that of its affluents. I will only select out of the numerous analyses which have been made, such as present an interest to English agriculture. The results of the researches made by MM. Boutron and Henry, show the various matter contained in the Seine water before its entrance into Paris, at two points of its passage through the city, and at its exit.

This analysis (page 432) is suggestive of many important conclusions as regards the physical modification which the waters of a river undergo in their passage through a town. Thus it is found that the quantity of bicarbonate of lime, sulphate of lime, alkaline azotate (or nitrate), and organic matter, singularly increases as the stream flows through the city of Paris. But if so sensible a progression in the quantities of mineral and organic matters is noticeable in the river Seine, which after all receives but a comparatively small proportion of the sewerage of Paris, where houses have few or no cesspools connected with sewers, how vastly greater must be that increase in the river Thames, for instance, from its approach at Putney to its exit at Greenwich, receiving as it does the offal of so vast and populous an area!

Analysis of a Litre of Seine Water, = to 1·760773 Pint.

Matter Contained in the Water	Ivry	Notre Dame.	Gros Caillou.	Chaillot
Gaseous Matter.	Pints.	Pints	Pints.	Pints
Atmospheric air	0·005	0·005	0·007	0·005
Free carbonic acid gas ..	0·023	0·024	0·024	0·023
Solid Matter.	Grains.	Grains	Grains	Grains
Bicarbonate of lime	2·037	2·685	3·534	3·549
Bicarbonate of magnesia	0·925	0·938	1·157	1·173
Sulphate of lime . .	0·308	0·612	0·617	0·687
Sulphate of magnesia . .	0·154	0·262	0·417	0·355
Sulphate of soda				
Chlorate of calcium .. .	0·155	0·386	0·494	0·494
Chlorate of magnesium .				
Chlorate of sodium				
Salts of potash . .	traces	traces	traces	traces
Alkaline azotate . . .	slight traces	slight traces	slight but clear traces	slight but clear traces
Silicic acid, alumina, and oxide of iron	0·124	0·221	.	.
Organic matter	traces	traces	0·355	0·378
Total	3·703	5·107	6·574	6·666

Further researches made by MM. Girardin and Preisser have brought to light another phenomenon, no doubt common to all rivers similarly situated with the Seine, namely, that a large proportion of the mineral salts absorbed by the river on its passage through Paris are precipitated on its way down to Rouen; for the Seine water at Rouen was found to contain a less proportion of mineral matter than on its exit from Paris. This difference relates principally to silicic acid and carbonate of lime. On the other hand, MM. Bobierre and Moride have found that the waters of the Loire contain a less proportion of mineral compounds of silicic acid with aluminium and other bases, below, than above the city of Nantes; whilst organic matter and calcareous salts have sensibly increased. The explanation of the latter phenomenon is found in the hypothesis, that such substances as silicate of alumina held suspended by the waters of the Loire are precipitated during the passage of that river through the town, owing to the many obstacles which break the velocity of the stream within the harbour, and thus allow such salts to settle down. The increase in calcareous salts is easily accounted for by the affluence of the river Erdre, which is strongly impregnated with them. Nevertheless this phenomenon exhibits a remarkable contrast to what has been observed in the Seine, both at Paris and Rouen. Although the precipitation of the carbonate of lime is easily explained, the question still remains, how is the silicic acid so acted upon that it undergoes a diminution from 1·466 to 1·157 grains per litre (= 1·77 pint)? It has been suggested that the carbonic acid disengaging itself from carbonate of lime, or being rapidly generated in a water rich in oxygen and receiving a copious supply of decomposed organic matter, may act upon the various silicates so as to dissolve them.

I merely allude to these questions to show of what importance they are in regard to the application of the waters of our streams for the purpose of irrigation.

There are, however, in France many disturbing causes, such as violent rain-storms, which suddenly and in a great degree alter the chemical character of the waters of the large rivers. The Loire, for instance, after a great fall of rain, becomes strongly impregnated with silicic acid and silicates, because its own source and that of most of its affluents take their origin and flow for a considerable distance through feldspathic strata. On the other hand, it is important to observe that rivers, when flowing through marshy valleys, frequently get their waters poisoned by noxious solutions, adverse to plants of a higher order. Their sluggish waters, loitering in the midst of a mass of rank aquatic vegetation, are robbed of nearly the whole of their oxygen by the requirements of these greedy plants; and they moreover dissolve decomposed organic débris, which tinge them with a dark opaque hue, and impart to them an offensive and unhealthy odour. Such are several of the affluents of the lower Loire.

Having thus incidentally noticed the principal chemical features of the Loire, I will rapidly examine the other important geological and chemical features of the Gironde and the Rhone, deeply regretting that the limits of this paper do not permit me to follow the interesting researches made on many of the tributaries of the Loire by French chemists, especially MM. Bobierre and Mérode, and record the very remarkable phenomena they have noticed and examined, and the valuable mass of information they have collected. The following are the chief geological features of the Loire basin:—From its source to its junction with the Allier, the Loire flows over a series of crystalline formations, such as granite, gneiss, porphyry, and volcanic rocks. From its confluence with the Allier, that is from Nevers to Angers, it traverses the skirt of secondary strata, which surround the great northern tertiary basin. At Orleans its basin is only divided from that of the Seine (with which it is made to communicate by the canal of Briare) by a very slight undulation in the ground, of so easy a declivity that the locomotives of the railway ascend it with the greatest ease. This explains why the

Loire in that part of its career receives no tributary on its right bank. Not so on the left, whence she receives the Cher, the Indre, and the Vienne. These rivers likewise spring from the crystalline formation, but some fall into beds hewn out of the lower chalk, between hills having at their summits some remants of tertiary deposits. From Angers to the ocean the bed of the river becomes narrowed between higher banks, and the geological strata over which it flows belong to the older formations, such as the Devonian and the Silurian. The mean flow of the Loire, as ascertained by M. Daue is as follows :—

At St. Just and Andressieux, not far from its source, it gauges 1320 gallons per second; at Roanne, lower down, where it begins to be navigable, 1540 gallons per second; at Briare and Orleans, 6600. At the time of its great freshets, the quantity of water that flows at Roanne reaches sometimes the enormous amount of 880,000 gallons per second; at Ancenis, between Angers and Nantes, 2,000,000.

The two great rivers that form the Gironde, at their junction at Bec d'Ambre, near Bordeaux, viz., the Dordogne and the Garonne, greatly differ as to their origin and the geological strata which they traverse in their course. The Dordogne takes its rise in the great central mountains of Cevennes, out of the igneous rocks of which they consist; then passes through Jurassic strata; and, lastly, over tertiary deposits down to the ocean. On the other hand, the Garonne, in a course of 550 miles, waters no less than nine important departments of the south of France; and from the richness of these districts and the fame of their produce, derives an importance second to that of none of the other great French rivers. As already stated, it springs from the granitic peaks of the eastern Pyrenees; but most of its left-bank tributaries issue forth from the chalk buttresses of the more western Pyrenees, and flow over secondary and tertiary strata. The Garonne gives at Toulouse an average of 26,400 gallons of water per second. In times of freshets it rises up to 24 feet above the mean height, and gives 1,320,000 gallons of water per second. Its waters contain a strong proportion of silicic acid, and a noticeable quantity of other mineral salts.

That part of the Rhone basin which belongs to France, together with that of the Saône, comprises an area of nearly 28,000,000 acres. The source of the Rhone is among the crystalline rocks of the St. Gothard. On its way through the canton of Valais it flows over the calcareous and schistose rocks which characterise the Jurassic formation of the Alps; it then falls into the Lake of Geneva, where it rests awhile; from Geneva to Lyons its bed partakes more or less of the character of the hills that confine it; from Lyons to Valence it flows under the lofty ridge which separates its bed from that of the Loire, the two rivers thus flowing side by side in opposite directions; and thence to the Mediterranean, through a vast alluvial plain having no special geological feature. Its principal affluents, with the exception of the Saône, come from its left bank. Of these the Arve descends from Mont Blanc, the Isère and its affluent the Arc, from the wild peaks of the Savoisian Alps, traversing metamorphic and crystalline strata. The Durance, springs from the glaciers of Mount Genevre, amidst serpentine rocks, then meets the Jurassic formation, and lastly the tertiary strata, until it reaches the Rhone at Avignon.

The Saône gives at Lyons, on an average, 55,000 gallons per second: at the lowest ebb this quantity is sometimes reduced to 13,200. In times of freshets, such as that which took place in 1840, it gave about 880,000. The Rhone, when at its lowest ebb, gauges at Lyons 55,000 gallons per second. Its mean gauge, above its junction with the Saône, is 143,000. It pours into the sea through its two mouths no less than 4,444,000 gallons per second, when at the lowest ebb. In 1840 it gauged at Lyons no less than 1,320,000 gallons per second.

The Stagnant Waters of France.

Although running waters may, at intervals more or less frequent, occasion disastrous havoc, yet on the whole they are productive of immense benefit to mankind in a variety of ways, promoting every interest of civilised life, but especially agriculture. Not so, however, with stagnant water, which may be pronounced an evil unattended by a single redeeming advantage. Stagnant water is incompatible with the higher forms of organic life, whether in the vegetable or animal kingdom, and the first efforts of civilization have always been directed to the removal of that evil. Where these have proved ineffectual, the tide of men has invariably abandoned the spot to the lower forms of being which haunt these monotonous and, in our estimation, solitary wastes.

In England—thanks to the indomitable energy of the nation—this evil scarcely demands attention; its stagnant waters are getting more and more a thing of the past; the great eastern Fens are teeming with life, health, and fertility. Everywhere water finds an escape, although much remains to be done to expedite and regulate its exit.

But when it is stated that there are no less than 1,125,000 acres of swamps and undrained marshy land in France, it will at once appear that an examination of the water economy of that country could not be complete without a consideration of that evil. The aforesaid total does not include the area of lakes, ponds, undrained wet land, and swampy valleys, but merely the actual surface occupied by regular water-logged, pestilential marshes.

Between Bourg and Lyons lies the old principality of Dombes, which, with those of Sologne and Forez, shares the unenviable reputation of being the most insalubrious province of France. This vast plain measures about fifty thousand acres, but late improvements have reduced the unhealthy surface by nearly one-half. The soil consists of a strong impervious clay, which, being undrained and scarcely cultivated, retains all the water that falls upon or flows over its surface. In many parts, strong and abundant springs have forced their way through the clay, and converted vast tracts into pestilential swamps. The want of drainage, and the still greater want of manure, have suggested to the scanty inhabitants who still brave that endemic fever which here reigns unchecked, the strange expedient of what is called the system of pond cultivation. The whole of the principality is intersected by causeways to retain the surface-water, and thus to form large ponds into which fish are introduced. After the space of three years the pond is drained, the fish sold, and the bottom ploughed and sown; this water-fallow, of three years' duration, being equivalent to one application of manure It is easy to imagine what a mass of noxious effluvia must arise from this immense surface of stagnant water, in a climate at once hot and moist, where no water can be absorbed by the soil, and none is allowed to flow away, or find any other means of escape than the atmosphere.

The noxious influence of the emanations from marshy land on vegetable life are too well known to require here more than a passing notice, but their injurious action on animal life is no less evident. In the ancient province of Bresse, for instance—which extends from the foot of the southernmost prolongation of the Jura chain down to the immediate neighbourhood of Lyons—there are many excellent pastures, like so many islands of sound soil in the midst of an ocean of boggy and water-soaked land, cut up with large fish-ponds, the abode as well as the generating source of those endemic fevers that desolate the whole province. Even upon those excellent pastures the horses, oxen, and sheep that graze there soon become degenerate, and, if not removed, fall a certain prey to the deadly effects of malaria. The noxious gases which arise from these swamps seem to work a radical modification in the animal economy. The human race itself bears in its outward appearance unmistakeable tokens of the effects of the poison. The inhabitants are of low stature, their complexion is of a waxy, sallow whiteness; their flesh is loose and swollen, their abdomen largely developed. The vital power is sluggish, almost inert; so that the young are slow in arriving at the adult stage of life, whilst old age, on the contrary, is premature. The mean duration of life in that province, according to Condorcet, does not exceed eighteen years. Montfalcon says that in the space of twenty-two years the population of ten parishes in the marshy part of the department of Ain, which amounted in 1786 to 3606 inhabitants, had diminished by one-eighth. In Sologne the number of deaths greatly exceeds that of births. In the parish of Châtillon the annual register of births gives an average of $184\frac{5}{10}$ against $204\frac{6}{10}$ deaths. The difference in other parts of Bresse is thought to be still greater.*

The attention of the French Government has been lately drawn to this unfortunate district, with the view of applying a remedy. The principal proprietors, anxious to drive away this fatal fever from its haunts by cultivation, have applied to the Government for a sum of 120,000*l.*, sufficient, as they allege, to drain effectually the 25,000 acres which still remain to be reclaimed. This sum of 120,000*l.* should be distributed in the shape of premiums to the proprietors in proportion to the extent of their watery domains, and as a sort of indemnity to compensate the temporary loss of revenue which would ensue before the contemplated measures had produced their beneficial results, the property itself remaining in the hands of the Government as a pledge for prompt action on the part of the proprietors, and subsequent good cultivation; this kind of eventual mortgage being held to be a sufficient guarantee that the premiums would be well and effectually applied. An offer has been made to begin with about one-half of this extent; but the inhabitants justly object, that it would be both unjust and impolitic to do otherwise than grapple with the whole enterprise at once. Nothing has yet been done, but this vital question cannot remain long in abeyance; the evil is too glaring, the remedy too obvious.

The Table on the next page, compiled by M. Becquerel in 1850, will be found interesting from its showing the relation which the existence of stagnant waters bears to the duration of life.

In the department of the Ain a highly suggestive Table has been made, as regards the fluctuations of the population, comparing some of the towns that are situated at some elevations in the Jura mountains with others lying in the midst of the marshy plain.

	Increase.	Decrease
Belley	26·3	..
Nantua	18·4	..
Gex	..	6·2
Bourg	..	72·8
Trévoux	..	62·7

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* 'Annuaire des Eaux de la France,' p. 22.

Designation of Places.	Surface of Stagnant Waters per 1000 Acres	Population per Square Kilomètre	Mean Longevity.
Department of Cher.	Acres.		Years
Cantons of Argent, Angilon, Aubigny, and Vierzon	6	13·40	30·04
Department of Loiret.			
Cantons of La Ferté and Sully, not including the town of Sully	41	11·31	21·33
Cantons of Cléry, Jargeau, and Gien	7	22·50	30·64
Department of Loir and Cher (Sologne).			
Cantons of La Motte, Beuvron, Neung, Romorantin, and Salbris, not including the town of Romorantin	45	15·40	29·40
Cantons of Bracieux, St. Aignan, and Coutres ..	14	37·20	34·31

Nantua and Belley, which are built high in the mountains, show a steady increase of population; whilst Bourg, Trévoux, and Gex show an equally steady decrease. In fact, anything more desolate than this town of Bourg, and the flat swampy plain in the midst of which it is built, can scarcely be imagined. Having recently made an agricultural tour through this whole district, I am able to testify to the accuracy of these returns.

This state of things is not confined to the province of Bresse, but it exists in all its portentous reality wherever stagnant waters prevail. Another instance may be found in the department of Charente Inférieure. Of the six chief towns of that district, three—viz. Saintes, Jonzac, St. Jean d'Angely—are sheltered from the noxious marshy gases, whereas La Rochelle is only partially so, and Rochefort and Marennes are entirely surrounded with swamps. A trustworthy official report gives the following returns:—

	Increase of Population	Decrease of Population
Saintes	43 1	..
St Jean d'Angely	41·9	..
Jonzac	·19	..
La Rochelle	·72	..
Rochefort	..	360·0
Marennes	..	28·6

If we turn to the South of France in the department of Gard, two towns, Le Vigau and Alais, built in an elevated position over primary or secondary strata, may be contrasted with the others, Uzès and Nismes, situated, the former on a tertiary valley; the latter, at the extremity of that large rocky and swampy plain, which extends as far as the mouths of the Rhone. Their respective populations fluctuate in the following ratio:—

	Increase.	Decrease.
Le Vigan	28·5	
Alais	57·4	
Uzès		11·3
Nismes		50 9*

In Montpellier the decrease is 45·, whereas in the same department of Hérault, in more favoured localities as regards elevation and dryness of soil, such as St. Pons and Lodève, the increase is 48·. The authenticity of these returns cannot be challenged; but the question may fairly be asked how it is that the population does not become altogether extinct. The answer to this is, that the cheapness of living, the almost nominal rent asked by the owners of the soil of tenants willing to cultivate the farms, are sufficient inducements to attract people from the neighbouring districts, and it is thus that the population is kept up; for without this influx, the fearful preponderance of deaths over births would in a very short time leave these districts a desolate waste, where solitude and death would hold undisputed sway. The fatal effects of the marsh miasmata on animal life in various climates and positions are thus forcibly set forth. I have myself witnessed, in the desolate plain of Forez, the effect of periodical attacks of marsh fever on the languid and wasted forms of the once energetic labourers. During the summer months every human being who can do so flies from this accursed district, which only wants a little drainage and deep cultivation to become one of the most fertile and healthy plains in Europe. On a first visit to this spot I suggested the use of Howard's steam cultivator to a wealthy and enterprising proprietor. This implement may now be seen at work stirring the soil to a depth never before attained, facilitating a percolation of the stagnant surface-water. I am happy to say the results already obtained hold out the prospect of a speedy and complete regeneration of the whole district.

IV. *The Law of the Waters of France.*

The numerous and varied uses to which water is applied, its universal requirements for the support of animal and vegetable life, and the great evils it may produce if left to the direction of natural agencies, all show the primary importance of defining rights connected with it by legislation. Without going further back into the records of the history of mankind, it will suffice for my purpose to trace the connexion between the Civil Code at present in force in France and the old Roman law, in which it mainly originated. In no respect is this connexion more intimate than in the enactments bearing upon the supply of water, both in their letter and in their spirit; although some difference has naturally resulted from the changes which society has undergone in its organization. The Roman law, resting on a republican basis, paid especial regard to the rights and privileges of the individual—the *civis Romanus;* and to the commonwealth so far, and so far only, as it was compounded of, and bound up with, the rights of individuals. It was thus at once antagonistic to the spirit of centralisation which pervades modern continental policy, sacrificing the wellbeing of the individual to the supposed efficiency of the State; and also at variance with the feudal institutions, which subordinated all law to the privileges of the chief or his delegate, and left to the retainer little of rights, immunities, or protection, except in and through his immediate superior.

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* 'Annuaire des Eaux de la France,' page 24.

But if the Roman law of water is found somewhat deficient in providing safeguards for the general interest of the community, regarded from a central point of view, it must be said to its infinite credit that there is no record in history of so minute and careful legislation for the protection and the furtherance of the interests of agriculture.[*]

The principle that regulated the property of water by the old Roman law, evidently sprang from that ancient republican spirit which so characterised the first era of the existence of the Roman people. *Flumina omnia publica sunt.*[†] The ownership of all the rivers, together with their beds and their shores, was vested in the people. No restriction, no toll whatever, existed to limit or hinder the right every citizen had to the free use of the rivers, and each one had a right of action to vindicate that privilege, *ut in flumine publico navigare liceat.* The exercise of this right had no other limits but those arising out of the necessity and justice of respecting the rights of others. No one, for instance, could be permitted to hinder the navigation of a river, or to alter its course, or raise obstacles to its flow, or to commit any nuisance that might prejudice the rights of others, public or private.[‡] As regards those streams which were not constantly flowing, such as the beds of torrents, or again ponds and lakes, they were absolutely considered as private property, and protected by the same laws and immunities. *Nihil differt locis privatis flumen privatum.*[*] From the foregoing it may then be inferred that the Roman law recognised two kinds of ownership of water—the public and the private—and this is precisely the basis of the French law of water, as will presently appear.

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[*] 'Codices de Servitutibus et Aquâ,' lib. iii., tit. 34. 'Dig. de Serv. Praed. Rustic' lib. viii., tit 3. 'De Aqua et Aquæ Pluv. Arcendæ,' lib. xxxix, tit. 3. 'De Aquâ Quotidianâ et Œst.' lib. xliii. tit. 20. 'De Rivis,' tit. 21, &c., &c.

[†] 'Inst.,' lib. ii., tit. 1, § 2, 4.

[‡] 'Dig.,' lib. xliii., tit. 12. "Ne quid in flumine publico ripâve ejus fiat quo pejus navigetur, ne quid in flumine publico fiat quo aliter aqua fluat atque uti priore œstate fluxit,'' &c.

Wherever the power of Imperial Rome was extended, the Roman laws were implanted. This explains how much of that old legislation is now to be found in the codes of modern nations. When, however, the irresistible onslaught of barbarism had caused the total disruption of that mighty fabric of civilisation, the new political institutions which sprang out of the chaos of military despotism, although retaining more or less of the Roman code, bore from their feudal character the impress of oligarchy. Notwithstanding the efforts of the early Franks to maintain the public rights to the free use of navigable rivers, the lords were as yet too powerful and too lawless not to take advantage of their comparative independence, by laying on the rivers that traversed their estates various tolls and imposts, which rendered the public navigation of these streams all but an impossibility. It is only within comparatively modern times that the feudal rights obtained by the lords were finally wrenched from their grasp, and restored to the ownership of the nation. This excellent result was due to the celebrated ordinance of 1669, which is one of the most glorious achievements of Louis XIV.'s reign.

One of the most crying abuses of the feudal power of the nobles, and one most detrimental to agriculture, had been the reckless readiness with which the lords had granted rights of erecting mills and other hydraulic works upon the rivers within their jurisdiction. These structures, in obstructing the channel of rivers, not only impeded the navigation, but in rainy seasons led to calamitous inundations that swamped all the country round, and periodically ruined the agricultural peasantry. One of the first measures decreed by Louis XIV. was the annihilation of all such concessions granted by the lords since the year 1566, and the assumption by the king, through his regularly appointed agents, of the police, administration, and general management of all French rivers.

It must not be inferred, however, from this that all abuses were reformed, all obstructions removed. The truth is, nothing, or next to nothing, was done. The king had merely confiscated the alleged rights of the many to his exclusive personal advantage; but, nevertheless, the principle of public ownership of rivers by the nation generally, as represented by the king, was triumphantly established, and the control of waters removed from the grasp of lawless petty tyrants and vested in the central administration of the kingdom.

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[*] 'De Fluminibus,' lib. i., § 4.

At last, during the memorable night of the 4th August, 1789, all the remaining feudal privileges were voluntarily surrendered by the nobility. All prescriptive rights, whether vested in the state or in private persons, were for ever abolished as regards the rivers of France; and, moreover, all the secondary and minor streams, too shallow or unimportant to be navigable, but possessing a character of general utility, were declared the property of the nation, and made available for general use.* All existing tolls were abolished without indemnity.† These sweeping measures accomplished a great deal, no doubt, by removing tyrannical and arbitrary obstructions; but it was only in the course of time, just as the progress of agriculture and industry gradually revealed fresh fields of operation, that new enactments were added to the French "Code Civil," in order to remove obsolete prerogatives, establish new rights, and protect new interests. Thus until within the last fifteen years the word DRAINAGE is not even mentioned by the jurisconsults who have written on this subject; the thing was unknown, had no name in the language, and consequently no place in the legislation. The Romans were acquainted with it, as we shall presently see, and legislated upon it; but it is only in very recent enactments that the life-giving operation of drainage receives any special notice in the French code. It is, however, but just to state that the Civil Code, such as it emanated from the creative genius of the first Napoleon, contained general guarantees sufficiently protective to enable French proprietors to drain their estates without fearing that any opposition from their neighbours could hinder them from disposing of their drainage-water through other estates lying at a lower level. Yet that the present legislation is still incomplete, and far from being applicable to all the new requirements of modern agriculture, is a fact acknowledged by everybody; and this conviction has lately given rise to several projects of a special *Code Rural*, which although much discussed, have not yet been embodied in a law.

Having thus sketched the history of the French law of water, I will briefly describe its principal features, but exclusively in reference to agriculture. My task will thus be greatly simplified; for whereas the law of water is extremely explicit and exhaustingly minute as regards the navigation of rivers, the rights of fishing, and property of foreshores and alluvial formations, it presents, on the other hand, much less peculiarity in questions of agricultural interests and improvement.

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* Law of the 1st December, 1790.

† Law of the 28th March, 1790.

The laws which regulate the flowing waters of France may be divided into two classes, according as they relate to benefits to be derived or evils to be averted. Under the first head I will examine the rights of disposing of public streams for purposes of irrigation, the erection of water power, machinery, &c.; the second will comprise the regulations for the outfall of drainage-water, the flowing of sewerage, the erection of dams, and other interferences with the general outfall.

The only distinction which the law can make in the nature of water is that it is either public or private property. The water of running streams, considered apart from the bed in which it flows, belongs to nobody, or rather belongs to the owner of the land in the midst of which it flows only during its transit through his property. If he allows it to pass beyond the limits of his boundaries, he loses all his rights to its possession and use. But as a contingent advantage belonging to the soil, it is essentially regarded as a property, so much so that it can be mortgaged like other real property. It is to all intents and purposes *portio agri*, and, adds an ancient author, *certum est in jure, aquam contineri in appellatione rei immobilis.**

Private water is that which is exclusively available for the wants of private individuals (*quæ privatorum commodis inservit*) whether it springs within the boundaries of a proprietor or is brought from a public channel through a private one, artificially made, into the property, with the view to irrigation, ornament, or household use. Thus all channels constructed for purposes of irrigation are considered private property, although the water itself may be taken from a public stream. There are few districts in France, for instance, where so many irrigative canals exist as in the neighbourhood of Arles, or indeed throughout the whole of ancient Provence. All these canals tap the river Durance at divers points of its course, and bring its waters over the arid plain of Crau, which they clothe with luxuriant vegetation. They are recognized by the French law as private property, with which the power of the central government has no right to interfere so as to stop the supply of water which they receive from the Durance, notwithstanding it is a public river, and as such under the direct control of the public administration of "Waters and Forests."

Water is considered as public property when it runs continuously (*perenniter*), and when the nature of the land through which it flows is such as to constitute a highway. It matters not whether a public stream takes its source in a private property, it becomes public property so soon as it reaches a public highway, such as an old invariable channel, or the natural bed of a valley. *Non inspicimus principium aquæ undè decurrit, sed alveos et meatus undè transit in vetustissimum aquarium cursum.* It is in that part of the legislation which refers to running water that we must seek those enactments which deal with irrigation and drainage waters.

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* Pecchius, lib. ii., cap. 10; quoted by Dubreuil in his work 'Legislation sur les Eaux,' vol. i., page 3.

The old Roman law completely overlooked the waste water from irrigation; it deals only with running streams, derived from their very source (*quæ a capite ducuntur*); but in the north of Italy, where for many centuries a regular and general system of irrigation has prevailed, the attention of legislators has been from very remote times drawn to this subject, and the French law is now substantially in accordance with the Italian. This waste water from irrigation is termed in Italy by the name of *collaticia*. It is true the Roman law treats of a kind of percolating water, which it terms *sudores*,* but this evidently applies to spring water naturally oozing out through the land and then flowing away in a continuous stream. The legislation on this waste water from irrigation clearly enacts that the proprietor from whose land it flows must provide at his own cost a proper outfall, for which every facility is given him, so as to cause as little damage as possible to the properties lying at a lower level. The absolute ownership of irrigative canals was also recognised by the Roman law; and there are still extant in the south of France, especially in Provence and in the eastern watershed of the Pyrenees, about Mont Louis and Perpignan, many ancient canals used for irrigation, the grants of which date from a very remote period. Indeed, when that part of the country was under the dominion of the Visigoths, and, after them, of the Moors and Saracens of Spain, the old Roman customs seem to have been carefully preserved, and the rights acquired by the owners of the soil religiously respected.

The drainage of marshes and fen lands has at all times been the object of special legislation. In the old Roman law the definition of fen land was thus worded:—*Aqua minùs profunda, palam latiùs diffusa, quæ etiam quandoque siccatur.*† During the feudal régime in France the fens belonged to the lords, but the Revolution of 1789 vested the ownership of all waste parts in the parishes ("*communes*"). In the years 1860 and 1861 the French Government have passed new laws to facilitate the drainage and the ultimate cultivation of these lands; but the only new legal features in these modern enactments are the provisions for raising the capital required. Nothing is changed in the old legislation on the disposing of wastewater, &c.

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* 'Inst. de Aquâ Œstivâ et Quotidianâ.'

† 'Jus Georgicum,' lib. iii., cap. 14.

The owner of an estate traversed or even merely bordered by a running stream can make use of the water of such streams for purposes of irrigation, but he may not divert it altogether, and he is bound to return the stream after he has used it into the old channel at the point where his property ends. The old Roman law especially protected the rights of all the owners of property along the couse of a running stream. *Aquam de flumine publico*, it says, *pro modo possessionum ad irrigandos agros dividi oportet.*[*] But in this respect the French *Code Civil* recognizes the rights arising out of ancient custom.[†] If a careful examination be made of those established local usages, especially in districts where, as in Provence and Languedoc, from the dryness of the climate, irrigation has from time immemorial been indispensable to production, it will be found that the spirit of the Roman legislation has survived, and that all available historical records agree in establishing the fact that neither barbaric invasion, nor the lawless and arbitary rule of feudalism, nor the centralizing policy of the French kings, have been able to root out from the land, and from the habits and ideas of the cultivators thereof, those sacred principles of right and justice which Roman civilization has established, to protect and foster the interests of property.

On the important question of the right of constructing mills and other hydraulic engines on the course of public rivers, and that of constructing dams to raise the level of the water with the view of increasing its motive power, I have already referred to feudal practices and to the legislation of Lewis XIV. The famous ordinance in the year 1669, which quashed all concessions posterior to the year 1566, peremptorily ordered the demolition of such obstructions the owners of which could not produce titles anterior to that date. The law of the Directory, 19th Ventose, year VI., went further, and enacted that within one month all mills, &c., erected in virtue of feudal rights then abolished should be removed. Although the direct ostensible aim of that law was to facilitate the navigation of rivers, no practical agriculturist can fail to appreciate its value and importance for clearing the channels of rivers and protecting the freedom of their outfall.

It would no doubt be most useful to follow the French law, or rather the Roman legislation, through their elaborate and minute enactments for the protection of the interests of agriculture, in which every possible contingency is foreseen and properly met with a remedy; but this might extend my paper beyond reasonable limits. I will, then, bring this part of my subject to a close with a brief notice of the obligation imposed by the legislature to clear the bed of rivers, both public and private property, from any natural or accidental obstruction, so as to ensure a normal outfall, and keep the water down to a proper level. The Roman law distinctly enforces the cleansing of the beds of rivers, with the object either of removing obstructions from their channels, and so preventing their overflow, or secondly, of insuring the supply of wholesome and pure water to those who have a right to make use of them; or thirdly, guarding against the infection caused by stagnant water. *Nisi enim purgare et reficere fontem licuerit nullus ejus usus erit*, and, as another text has it, *ad salubritatem* and *ad tutelam civitatum pertinent.*

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[*] 'De Servit. Præd. Rust.'

[†] Art. 645. Dans tous les cas les reglements particuliers et locaux sur la cours et l'usage des eaux, doivent être observés.

As regards the obligations incumbent upon the owners of running streams, the law is as simple as it is clear. The state, as owner of all navigable rivers, is bound to clear them of all obstructions, as are likewise the proprietors of private streams, over the whole extent of their possessions.

Such are the principal features of the French law of water in its immediate bearing upon the interests of agriculture. The laws affecting sewage and noxious waters present important considerations, which may be treated of in a future communication. I close this paper, then, with the expression of a hope that it may lead the way to a full and careful investigation of the English law on the subject of the economy of the English waters, so that the attention of the legislature and of the agricultural community may be directed to the examination and revision of these enactments.

In France, as we have seen, first an absolute monarchy and next revolutionary frenzy, although evils in themselves, did good service to agriculture by removing the trammels which arbitrary, irresponsible self-interest had imposed upon the rivers of France. It remains for constitutional England, by enlightened foresight and public spirit, to reap similar fruits of progress without undergoing similar revulsions.

By the light of the old Roman law, not less venerable than feudal traditions, we may see how provision may best be made for the general interests of the community, and the welfare of each individual proprietor, with respect to the supply of water.

Those southern provinces in which the Roman code was most thoroughly established, and has to the largest extent survived, bear practical testimony to the soundness of its enactments by the superiority which, under many reverses of fortune, they still retain in all that relates to irrigation.

The British Isles, having a climate in which, under the influence of the Western Ocean, clouds and moisture preponderate, both require and will repay attention to this subject fully as much as the dry, sunny regions of the South.

If in no other part of the world greater vested interests have to be dealt with, because nowhere has water-power been turned to greater account in developing industrial enterprise, nowhere is an alternative so readily to be found in the use of the most finished steam-engines furnished with a boundless supply of coal. As Science, illustrated by enlightened Practice, makes us more and more familiar with the uses and abuses of water in connexion with agriculture, our incentives to improvement will be strengthened; prejudices and jealousies will abate; so that whenever the decision between the adoption of steam or water power already trembles in the balance, the consideration that the latter would in any way be detrimental either to health or fertility will instantly turn the scale.

Norwood, February, 1862.

XXI.—*On the Management of Clover Layers; the Proper Distance for Drilling Wheat; and the Ravages of Insects on Pines.* By CHARLES LAWRENCE.

To the EDITOR of the JOURNAL of the ROYAL AGRICULTURAL SOCIETY.

IT has been matter of common observation amongst the members of our Society that our Journal has of late years been wanting in variety of information, coveted more than ever by a very large proportion of the subscribers; and that it has been too much occupied by long scientific papers, to the exclusion of practical communications of experiments, and observations of the results of special modes of treatment in the culture of crops, and the management and feeding of animals, &c.

I have been led by such remarks to compare the contents of some of the last volumes with those of the early volumes, and I find those remarks confirmed to an extent I had not looked for. The first six volumes of the Journal contain 326 articles, comprising an infinite variety of useful information, chiefly from members of the Society; the last six volumes, 16 to 21 inclusive, contain 157 articles only, less than half the number contained in the first six volumes.

If agriculturists have not increased numerically, the number of the intelligent, the inquiring, and of the observing, has greatly increased during the age of our Journal. It therefore may be desirable to consider how it has chanced that there should have been a contemporaneous diminution of communications, and whether there may not be some means of correcting this anomalous state of things. Is it not desirable to invite and encourage brief reports from members of the Society and others to the Journal, of facts observed in their own practice, and the results of any experiments or observations arising on any novel practice in their respective neighbourhoods?

So long as our Journal is considered to be mainly designed for the promulgation of strictly scientific papers—valuable as undoubtedly they are—and for prize essays, many intelligent and observing farmers hesitate as to communicating results of their observations, under an impression they would not be valued or considered worthy of notice, or that they might be as an old story to their more advanced agricultural brethren. No doubt similar observations suggest like modifications of practice to many persons engaged in the same occupation; but when it is borne in mind that our Journal gets into the hands, directly, of several thousand members, and, indirectly, of many non-subscribers, the probability is that any special practice out of the ordinary routine of his county, which an individual has been led to adopt from his own observation and reasoning, will afford useful hints to many readers of the Journal.

After a longer exordium than I contemplated when I took my pen in hand, I will illustrate my views at the risk of communicating nothing new to many of our readers. Much has been said and written of late years of the difficulty of maintaining for any length of time the four-field system of cultivation, from the too-frequent recurrence of the same crop on the same land. *Clover-sickness*, as it is commonly called, is one case in point. I was sorely troubled with this complaint, whatever it might be; and my clovers failed to such an extent that I found it necessary to look about me. I observed that clovers generally stood well on deep, firm soils in the vales. I also observed that while the clover failed over a considerable portion of my own fields, there was always a good plant on the headlands, where the soil was most consolidated. I had been taught that the young clovers should be very sparingly fed, if at all, and then only by lambs for a short time after the spring-corn harvest; and I had adopted moderate and total abstinence in vain. In consequence of the observations to which I have adverted, I resolved on trying the opposite treatment of consolidation, by feeding sheep throughout the autumn; and I put first the lambs, and then the flock of ewes, upon the young clovers, by which means they were trodden firm, and looked anything but promising during the winter. In the following year I had by far the most regular crop of clover I had ever seen on the farm. I pursued the same treatment the following season; and considering the wheat-crop depended so materially on the clover-crop, I determined on an alteration of the common system of reserving all the farm-manure for the root-crop, and borrowed one-half for the seed-crop, to be laid on after the sheep. The sheep-treading and feeding having secured me a very perfect plant, and the manure an abundant crop during four successive years, I have thought that these facts may afford useful hints to some of the readers of our Journal.

On the Proper Distance between the Rows of Wheat, as a general rule.

I had observed, some years ago, that practically the question of width lay between 7 and 9 inches, and the quantity of seed varied between two and three bushels per acre. Desirous of arriving at some conclusion on these points for my governance on my own farm, which comprises heavy and light land, I have, during the last five years, sown several half-acre plots in the same field, varying in width from 8 to 12 inches between the rows, and with from four to eight pecks of seed per acre. Any one who has tried such experiments will have found, on comparing those of one year with those of another, in different fields, very perplexing discrepancies, arising from the variety of land sometimes occurring in the same field, and other disturbing causes. It is therefore only by repeated experiment, year by year, in different fields, that a reliable impression can be arrived at. The result of the experiments on my farm has been in favour of 12-inch intervals, and six pecks of seed. The largest produce I had in any year was from four pecks of seed with 12-inch intervals. I may add, these experiments have been made indifferently on light stonebrash and tenacious soils on stiff clay. During seasons in which mildew has been prevalent, I have observed that it has to a somewhat greater extent attacked the straw of the 12-inch than that with 8 or 9 inch intervals—a result I should not have anticipated *à priori*.

Ravages of Insects on Pines.

Though the following communication respecting a plantation on my farm belongs rather to arboriculture than agriculture, the warning may be useful to many readers of the Journal. In a belt of trees, planted some sixty years ago as a screen against the north wind, there was an outside row of Scotch firs. These having become bare and almost useless for the intended purpose, six years ago I planted between them small plants of the *Pinus Austriaca*, a more close-growing and effective species for the purpose, with the view of removing the Scotch firs when the Austriacas got well established. This plantation was divided in the middle by an entrance-road to the farm. The Scotch firs on one side the road were cut down and carried away at once in the autumn of 1860. In the winter of the same year those in the other division were cut down, but from one cause or another were left on the ground till they could be removed without damage to the crops adjoining, and remained in the plantation during the following summer. The Austriacas were at that time growing most luxuriantly, the peculiar tint of their foliage evidencing perfect health and vigour. Late in the summer, to my vexation, I saw the tips of every branch turn brown in one division of this plantation, while none of the young trees in the division on the other side the road were similarly affected. I chanced to meet a friend who is skilled in natural history, and pointed out to him this grievance. He told me that on examining the tips of the branches where they became dead I should find a perforation, and on tracing the pith upwards I should find a small black beetle. I found the enemy he had described. I was still at a loss to account for the young trees on the other side the road being entirely free from this infliction; but on mentioning to my friend the particulars I have before stated, he informed me at once that the Scotch firs which had been left on the ground so many months were the source of the mischief. On reference to the 'Treatise on Insects,' by Vincent Kollar, I find this beetle is the "*Hylesinus* (*Hylurgus*) *piniperda*," which attacks the Scotch pine and its allied species in preference to any other pines. His account exactly agrees with my case: he states:—"The abode and place of propagation of the perfect beetle are in the pith of the young shoots of the pine, particularly in the side twigs. The beetle burrows for one or several inches below the terminal bud on the youngest shoots, eating out the pith straight upwards, and gnawing out again near the bud or through it. The eggs are laid under the bark of *sickly* and *felled* pines, in the bark of which the maggot also lives. The maggot lives on the stagnated fermented juice under the bark. The larvæ feed on the trunks of *dead* or *dying trees*, and the beetle only places her brood on *healthy* trees when necessity compels her to do so. In young woods, cutting off the attacked shoots and burning them is the only successful method of destruction."

I shall be glad if this lesson of the importance of removing from plantations any Scotch firs as soon as they are felled or show symptoms of ill condition, may save others the infliction I have experienced.

Cirencester, *Nov.* 18, 1861. CHARLES LAWRENCE.

XXII.—*Report on the Exhibition and Trials of Implements at the Leeds Meeting.* By H. B. CALDWELL, Acting Senior Steward.

As the Senior Steward of Implements I have great pleasure in being able to speak of the perfect success of the Royal Agricultural Society's Meeting at Leeds, which exceeded that of all preceding Meetings, so that the most sceptical must now be convinced that the working arrangements of the Society have fully carried out the objects of its first promoters, whether for the improvement of the existing Implements of all classes, or the introduction of new ones. In both respects the efforts of the Society to aid the vigorous enterprise of the makers have been eminently successful, until, as a crowning success, the application of steam-power to field culture has been brought to a most satisfactory issue.

That perfection has been attained I certainly will not venture to assert, especially after witnessing the great improvement made during the last year; but that great progress has been made is fully proved by the surprise and satisfaction expressed at the great advance made in the working of the several Implements by the practical men who came from all parts of Great Britain as well as from abroad to witness our trials.

From the trials at Garforth the farmer must draw his own conclusions on the adaptability of steam to the cultivation of the soil, but it is my firm conviction that the "scarifier" of Mr. Fowler, as well as the "smasher-up" of Mr. Howard, when worked at their full depth, are of inestimable benefit to stiff clay-lands which have been properly drained. This was proved on the stiff and well under-drained clay which they severally pulled up during their trials at Leeds, to much greater depth than the machines were set for.

The Judges' Report will, I hope, prove a good guide to purchasers as to the capabilities of the different systems; and as rope-traction requires so little power, it must, until some great change occurs, be the prevailing system for dragging the implements through the soil.

All the arrangements made for these trials were carried out with perfect success, and great thanks are due to the Railway Company, which kept trains constantly running for the convenience of every one who wished to see the proceedings at Garforth.

In my Report last year I intended to allude to the scanty show of implements at Canterbury, but I refrained from doing so out of deference to the wishes of others, being told that a good understanding had been come to between the Society and the several exhibitors, and that all was to be right this year at Leeds. Still we had secessionists, but, I am happy to add, so good a show, that they must regret their own absence, which probably caused a greater loss to themselves than to purchasers, who could doubtless find, among the goodly rows of implements exhibited, tried implements to suit the requirements of any farm. Our trials of Implements, however carefully and impartially conducted, cannot quite escape the imperfection common to all things, nevertheless they are the best guide within the reach of the ordinary farmer, who must necessarily turn to some adviser for assistance.

The benefits which we have received from the Society's Exhibitions of Implements have resulted from the prize system, and the often abused judges have suggested many improvements, for which they receive little thanks from the makers who have profited by them. The attempt now seems to be to make a bazaar of our Show-Yard; for even this year some of the exhibitors had no implement in their stands that was named for this year's trial.

Thus much I may say for the Meeting at Leeds, that since I have been a servant of the Society, I never saw exhibitors so cheerful,—a result which I attributed to the amount of business being done—which I understand was on a larger scale than at any previous meeting.

In a financial point of view, this Meeting was eminently successful, the receipts for admission to the Show-yard amounting to 9900*l.*, whereas the average sum derived from this source for the 22 previous years has been about 3000*l.** I trust that these receipts may enable us to give hereafter even larger prizes for

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* This increase was entirely due to the great influx of visitors on the Thursday and Friday, the 1s. days. It was satisfactory to remark among this great mass of working-people such a spirit of order and good-humour—in this respect our great annual gatherings certainly exercise a civilizing influence on the population. The machinery in particular often received thoughtful and minute attention from a dense ring of artizans standing quietly around, and it is not impossible that our agricultural mechanism may hereafter derive valuable suggestions from the interest thus awakened.

If we compare the Leeds and Chester Meetings, the account of admissions will stand as follows —

Leeds			*Chester*		
Monday, at	5s.	2,027	Monday, at	2s. 6d.	1,251
Tuesday,	2s. 6d.	10,287	Tuesday,	2s. 6d.	4,827
Wednesday,	2s. 6d.	18,823	Ditto	5s.	3,180
Thursday,	1s.	73,824	Wednesday,	2s. 6d.	24,790
Friday,	1s.	40,368	Thursday,	1s.	27,726
		145,329			61,774

Between these two cases the parallel is not perfect, in consequence of a change of regulations as to the first exhibition of the Live Stock, but it appears that the admissions—

		At Leeds.	*At Chester.*
At 5s.	were	2,027	3,180
2s. 6d.	,,	29,110	30,868
1s.	,,	114,192	27,726

The results of this Meeting in respect of receipts and admissions will also be regarded with interest, in consequence of the privilege of free admission lately granted to the Members of the Society having there first come into operation; it must, therefore, be borne in mind that these large receipts were realized in spite of a new regulation which tends to their decrease.

It appears that the number of Members admitted without payment was on—

Monday,	at	5s.	204
Tuesday,		2s. 6d.	358
Wednesday,		2s. 6d.	364
Thursday,		1s.	65
Friday,		1s.	65
		= 147*l* 15s.	1056

The receipts thus sacrificed by the Society are, however, by no means a measure of the accommodation afforded to Members; for when various trials of Implements are in progress outside the Show-Yard, subject to being delayed, postponed, and renewed, the value of this free power of egress and return can scarcely be over-estimated.—P. H. F.

New Implements or those capable of Improvement; but every well-wisher to the Society, who in July last watched with anxiety the heavy clouds which so frequently hang over our most populous districts in the north-west, will have felt on what small fluctuations of climate the successful issue of the Meeting depended, where the outlay was large and inevitable, but the return highly precarious in respect both of profit and enjoyment. We have much reason to be thankful for the happy result, and we may hope for, but not reckon on, similar success hereafter.

The town itself, though not dressed up as gaily as some other places which the Society has visited, was distinguished by its successful endeavours to assist all the officials; the Local Committee were assiduous in paying us every attention, both in the Field and the Yard; the excellent arrangements for the dinner in the magnificent Town Hall also call for special notice.

In fact, so much might be said on this Meeting—the crowning point of the "good working" of this great Society—that I sincerely wish that the task had fallen into hands more able than mine to do it full justice. But the Meeting has spoken for itself; and I can assure all the members, with many of whom I have worked for several years, that I am most happy to have been an Acting Steward on such an occasion. To the Hon. A. Vernon, who worked hard for nearly three weeks in superintending the Steam Trials, the thanks of our Society are especially due; as also to the Judges of Steam-Cultivators, Messrs. Owen, Owen Wallis, and C. Sewell Read.

That the Society may continue to flourish, through both bad report and good report, and that it may find gentlemen as willing to work for it as heretofore, is the ardent and sincere wish of its retiring Steward.

Lackham House, Chippenham, Wilts.

Report of the Judges on Drills, Manure-Distributors, and Horse-Hoes.

DRILLS FOR GENERAL PURPOSES.

The machines exhibited in this class were very numerous, and comprised all the varieties which have marked the exhibitions of former years. Neither in the general principles of construction nor application of details is there any striking novelty to notice; the few alterations observable are merely slight variations in form, involving no substantial change. This fixity of type, which has existed for the last seven years, is not, however, a matter of reproach, for it is scarcely possible to specify any object attainable by drilling which is not accurately attained by one or other of the machines which have been tested and have received the prizes of the Society for the present year.

It is the more gratifying to the Judges to be able to speak so favourably of the excellence of this year's exhibition, as some inferiority might reasonably have been apprehended from the fact that two or three eminent makers, who have gained great distinction and generally carried off the Society's prizes in former years, did not exhibit on this occasion.

Whatever be the cause of this withdrawal, it does not appear that the general interests of the agricultural community are likely to suffer. The constant and increasing demand for the best implements naturally brings a full supply. New men have risen up to supply the vacant places, who show a determination to profit by the fortunate opportunity which has been so unexpectedly afforded them.

It is, perhaps, natural that those who have gained distinction in former competitions should wish to rest upon it, and should think that the competition and prizes instituted by the Society might be now dispensed with; but the principle of competition seems to be the essence of the Society's influence, as it is the life of all improvement. In this, as in other walks of life, men may retire, but cannot rest upon past achievements; and it is scarcely to be expected, and not to be desired, that any change should hastily be made in a system which, whatever objections may be urged against it, has, during the last twenty years, produced the most satisfactory results.

The Society's prize of 30*l.* for drills was divided between two classes: the first for drills for general purposes, drilling corn and roots with manures; the second for those which drill corn and roots only, without manures.

Ten drills were selected for trial, belonging to Mr. James Coultas, junr., Messrs. Coultas and Son, Messrs. Robert and John Reeves, Messrs. Holmes and Son, Messrs. Priest and Woolnough, Mr. Malthouse, Mr. Teasdale, and Messrs. Gower and Son. All these had the steerage apparatus, and for the most part worked in a satisfactory manner.

Careful experiments were made to test the quantity of seed delivered per acre, by measuring the ground traversed, and by receiving into bags and subsequently measuring the quantity of seed deposited. The accuracy of this operation, combined with the construction of the drill and the selling price, determined the award.

In the 1st Class, the 1st Prize of 10*l.* was awarded to Mr. James Coultas, junr., for article No. 31, the 2nd Prize of 3*l.* to Messrs. James Coultas and Son, for article No. 810, the 3rd Prize of 2*l.* to Messrs. Robert and John Reeves, for article No. 1273.

In the 2nd Class, the 1st Prize of 10*l.* was awarded to Mr. James Coultas, junr., for article No. 39, the 2nd Prize of 5*l.* to Messrs. Holmes and Son, for article No. 450.

The Judges highly commended article No. 812, exhibited by James Coultas and Son; and commended No. 1519, exhibited by Messrs. Priest and Woolnough.

DRILLS FOR GENERAL PURPOSES FOR SMALL OCCUPATIONS.

The Prize of 10*l.* for drills for small occupations was also divided into two classes: 1st. For drilling corn and roots only; 2nd. For drilling corn and roots with manure.

Ten drills were selected for trial in this class, belonging to Messrs. Hensman and Son, James Coultas, jun., Messrs. R. and I. Reeves, Messrs. Holmes and Son, Mr. G. Malthouse, Messrs. Hunt and Pickering, and Messrs. Gower and Son, and tested in the same manner as the larger drills.

The Judges are of opinion that these drills, as now constructed with steerage apparatus, give the small occupier the power of drilling his corn, if not quite so cheaply, yet as accurately as the large occupier, and place him at much less disadvantage in point of economy than he has hitherto been.

In the 1st Class, the Prize of 5*l.* was awarded to Messrs. W. Hensman and Son, for article No. 1553.

The Judges highly commended article No. 41, exhibited by Mr. James Coultas, junr.; and commended article No. 1275, exhibited by Messrs. R. and I. Reeves.

In the 2nd Class, the Prize of *5l.* was awarded to Mr. James Coultas, junr., for article No. 33.

The Judges highly commended article No. 453, exhibited by Messrs. Holmes and Son; and commended article No. 1583, exhibited by Mr. George Malthouse.

DRILLS FOR TURNIPS AND OTHER ROOTS.

These were classified in three divisions:—

1st. For drilling on both ridge and flat.
2nd. On the flat only.
3rd. On the ridge only.

Thirteen drills were selected for trial, belonging to Messrs. Holmes and Son, Messrs. R. and I. Reeves, Mr. James Coultas, jun., Messrs. Priest and Woolnough, Messrs. Gower and Son, Mr. H. Kearsley, Mr. James Clarke, Mr. John Barker, Mr. M. Dale, Messrs. Hunt and Pickering, and Mr. J. Teasdale.

Most of these machines were capable of making excellent work. The main difference consisted in the mode in which the manure was deposited and covered before the dropping of the seed. The machines to which the prizes were awarded accomplished this operation most efficiently.

In the 1st Class, the 1st Prize of *10l.* was awarded to Messrs. Holmes and Son for article No. 456; and the 2nd Prize of *5l.* to Messrs. R. and I. Reeves, for article No. 1277.

In the 2nd Class, the 1st Prize of *6l.* was awarded to Mr. James Coultas, jun., for article No. 35; and the 2nd Prize of *4l.* to Messrs. Priest and Woolnough, for article No. 1198.

In the 3rd Class, the Prize of *5l.* was awarded to Messrs. Gower and Son for article No. 1547.

WATER-DRILLS.

Two drills only were tried in this class, both of which made very good work. Messrs Reeves's drill appeared to be the best constructed, and to them the 1st Prize of *7l* was awarded for article No. 1282, and the 2nd Prize of *3l.* to Mr. W. Watkinson, for article No. 921.

DRILLS FOR SMALL SEEDS.

In this Class four drills were tried, exhibited by Mr. James Coultas, jun., Messrs. Holmes and Son, Mr J. Barker, and Mr. W. S. Underhill.

The best drill was that manufactured by Mr. J. Coultas, jun, which, besides drilling clover and rye-grass together in the ordinary method (operations that are difficult to combine), has an arrangement by which they can be separately distributed. To Mr. James Coultas, jun, the 1st Prize of *7l.* was therefore awarded for article No. 36, and the 2nd Prize of *3l.* to Messrs. Holmes and Son, for article No. 461.

DRILL-PRESSERS.

Four drills were tried in this Class, belonging to Messrs. Hensman and Son, Mr. G. W. Robinson, Mr. J. Barker, and Mr. T. Butcher.

The 1st Prize of *7l.* was awarded to Messrs. Hensman and Son, for article No. 1559, a compact and well-constructed machine, consisting of a presser of two wheels, with drill for dropping seed, and two coulters attached, by which the seed was immediately covered, and the whole operation completed with neatness and accuracy.

The 2nd Prize of *3l.* was awarded to Mr. G. Robinson, for article No. 1492.

DRY MANURE DISTRIBUTORS.

Eight machines in this Class were selected for trial, belonging to Mr. Thomas Chambers, jun., Messrs. Holmes and Son, Messrs. Priest and Woolnough, Messrs. R. and I. Reeves, Mr. James Coultas, jun., Mr. John Green, Messrs. Denison and Son, and Messrs. Gower and Son.

These distributors were tried with moist ashes and with soot, the object being to ascertain the smallest quantity which could be evenly and accurately distributed.

With large quantities, nearly all the machines performed fairly, but in distributing small quantities of concentrated manure, Mr. Chambers's drill showed its superiority. It is now seven years since this drill was first exhibited; it still remains without alteration, and yet the best machine extant—a rare instance of perfection attained on the first essay.

The 1st Prize of 7*l.* was awarded to Mr. Thomas Chambers, jun., for article No. 890; and the 2nd Prize of 3*l.* to Messrs. Holmes and Son, for article No. 464.

The Judges highly commended article No. 1199, exhibited by Messrs. Priest and Woolnough; and article No. 1284, exhibited by Messrs. R. and I. Reeves; and commended article No. 37, exhibited by Mr. James Coultas, junr.

LIQUID MANURE DISTRIBUTORS.

Three machines were tried in this Class, belonging to Mr. W. Crosskill's Trustees and Mr. I. James.

The 1st Prize of 6*l.* was awarded to the Trustees of Mr. W. Crosskill, for article No. 400; and the 2nd Prize of 4*l.* to Mr. Isaac James, for article No. 1102.

Both were tried first with plain water, and then with an admixture of superphosphate. It appeared to the Judges that no manure could be advantageously distributed with water by these machines but such as could be easily mixed and held in solution. When there was much sediment the action was not satisfactory; but for ordinary tank-water and thoroughly soluble manure the application was satisfactory and complete.

HORSE-HOES, SINGLE ROW, ON RIDGE OR FLAT.

Many admirable implements were exhibited in this Class, and no less than twenty selected for trial, belonging to Messrs. Carson and Toone, the Busby Agricultural Implement Company, Messrs. E. Page and Co., Mr. Thomas Allcock, Mr. Jonathan Stalker, Messrs. I. and F. Howard, Mr. John Robinson, Mr. C. Clay, Messrs. Bonds and Robinson, Messrs. Wallis and Haslam, Mr. James Mellard, Messrs. Hunt and Pickering, Mr. W. S. Underhill, Mr. Thomas Butcher, Messrs. I. and F. Hancock, Messrs. Mapplebeck and Lowe, and Messrs. W Hensman and Son.

The excellent, and, in some cases, almost equal, performance of these implements left the Judges a most difficult and delicate task in deciding upon their respective merits. After a careful trial, the 1st Prize of 5*l.* was awarded to Messrs. Carson and Toone, for article No. 54; the 2nd Prize of 3*l.* to the Busby Agricultural Implement Company, for article No. 521; and the 3rd Prize of 2*l.* to Messrs. Page and Co., for article No. 1600.

The Judges highly commended article No. 501, exhibited by Mr. Thomas Allcock; and article No. 1309, exhibited by Mr. Jonathan Stalker; and commended article No. 1058, exhibited by Messrs. I. and F. Howard.

HORSE-HOES, FOR GENERAL PURPOSES.

Nine implements were tried in this Class, belonging to Messrs. Priest and Woolnough, Messrs. Hunt and Pickering, Mr. Isaac Spight, Mr. Wm. Smith, Messrs. Holmes and Sons, Mr. W. A. Munn, Messrs. I. and F. Howard, and Messrs. E. Page and Co.

The 1st Prize of 7*l.* was awarded to Messrs. Priest and Woolnough, for article No. 1201; the 2nd Prize of 5*l.* to Messrs. Hunt and Pickering, for article No. 1148, and the 3rd Prize of 3*l.* to Mr. Isaac Spight, for article No. 174.

The Judges highly commended article No. 166, exhibited by Mr. Wm. Smith; and commended article No. 465, exhibited by Messrs. Holmes and Sons. Apart from the aggregate of general merit which determined the award of the prizes, there is one novel feature which is peculiar to Mr. Spight's machine, and deserves high commendation: by the motion of a simple rack and pinion, the whole framework of the hoe can be elevated or depressed, while in motion, to any desirable depth.

HORSE-HOES, FOR THINNING TURNIPS.

Two machines, belonging to Mr. John Eaton and Mr. John Barker, were tried, and the whole Prize of 5*l.* was awarded to Mr. J. Eaton, for article No. 1035, an implement which showed great superiority.

THOMAS HUSKINSON.
JOSEPH DRUCE.
JOHN THOMPSON.

Report on GRASS-MOWERS, CORN-REAPERS, HAYMAKING-MACHINES, *and* HORSE HAY-RAKES.

The implements submitted to us for trial comprised both simple grass-mowing-machines, and those combined with corn-reapers; haymaking-machines; and horse-rakes for both hay and corn.

As the trial of corn-reapers has been postponed till the time of Harvest, our observations on the combined reaper and mower may be reserved for a subsequent Report, and our remarks at this time confined to the grass-mowers only.

We have much pleasure in bearing testimony to the mechanical skill and inventive talent that is displayed in this most interesting department of agricultural economy, and we feel justified in believing that before long a machine will be brought out that will be all that can be desired.

After a careful investigation of the merits of the different competitors, in which we were most materially assisted by Mr. Amos (whose valuable tabular statement of facts obtained by the dynamometer is subjoined), we arrived at the conclusion that we should best promote the public interest and discharge our own duty by dividing the prize; and we awarded to Mr. W. M. Cranstoun 8*l.*, to Messrs. Burgess and Key 7*l.*, and to Mr. B. Samuelson 5*l.*

The machine exhibited by Mr. Bamlett, of Middleton Tyas, lays its swathe in a very perfect manner, which for artificial grasses is of so much importance that it deserves commendation, and we hope to see it improved and reconstructed in other respects, so as to increase its general efficiency.

In the department of haymaking-machines, the points of excellence were so closely contested between Messrs. Howard and Mr. Nicholson, that there also we divided the prize, and in such proportion as appeared to us to meet the justice of the case, assigning to Mr. Howard 6*l.*, to Mr. W. N. Nicholson 4*l.*

Messrs. Howard's horse-rake was superior to any other exhibited, and received the prize of 10*l.*

We cannot conclude this Report without acknowledging the perfect order which was maintained in the trial-fields by Mr. Eddison, the courteous and efficient representative of the local authorities, and to him and the implement-makers themselves we are particularly indebted for affording us a full opportunity for conducting the business assigned to us without let or hindrance.

W. TINDALL.
JOHN HICKEN.
G. M. HIPWELL.

MOWING-MACHINES.

Maker's Name.	Article.	Width Cut	Quantity Cut in Acres per Hour.	Tractive Strain on Dynamometer.	Speed of Horses in Feet per Minute	Horse-Power used continuously	Speed of Horses in Miles per Hour.
		ft. in		lbs			
Samuelson ..	603	4 5½	1·333	173·2	219·2	1·151	2·491
Cranstoun	222	4 3	1·335	132·9	228·1	·918	2·523
Burgess and Key	499	4 0	1·326	270·9	240·7	1·976	2·735

Remarks.—Samuelson's machine had contrivances for increasing the flexibility of the "knife-frame," that it might press more easily over uneven ground; but these made the machine more complex and liable to derangement.

Cranston's machine was very light in draught, and the arrangement of its parts made it very manageable, the workmanship and materials were good, but there is reason to fear that the machine would be too light for heavy crops.

Burgess and Key's machine was strong, well made, and suitable for the cutting of heavy crops It was the heaviest in draught, but it would seem that the knife-frame was not well attended to, and undue friction existed.

C. E. AMOS.

Supplementary Report by the Judges of Reaping Machines.

The Trial of Reapers included in the programme of the Leeds Meeting of the Royal Agricultural Society, but necessarily deferred until the time of Harvest, was carried out on Wednesday, August 21st, and the two following days under most favourable auspices, at Garforth, on the farm of Mr. Furniss, in close proximity to the heavy lands on which steam cultivation had recently been so effectually tested. All honour is due to Mr. Furniss, and to Messrs. Atkinson and Nicholson, the gentlemen who undertook the arduous duties of field stewards, and represented the local committee on this occasion. To them may be ascribed the merit of those arrangements which could alone have secured the opportunity for a fair and comprehensive trial. Those who beheld the numerous staff of efficient labourers with their cheerful-looking wives and daughters to assist in gathering the corn, together with the splendid teams of horses placed at the disposal of the Society, could alone appreciate the personal sacrifices which these gentlemen must have made at such a season. The great mercantile community at Leeds may well be proud of their agricultural neighbours who have contributed so much to the universally acknowledged success of the late Meeting; a success which cannot fail to be more than gratifying to the liberal representatives of the Gasgoine family, whose excellent agent, Mr. Fox, suggested the Parlington Estate as the arena for these trials. Mr. Caldwell and Mr. Torr were in attendance, in virtue of their office, as Stewards of the Society, accompanied by Mr. Amos, the consulting engineer, and were ever ready to further the business of the day.

The prizes to be awarded were as follows:—

In Class I.—For Reapers with self-delivery	£20
In Class II.—For Reapers without self-delivery	10
In Class III.—For Combined Reapers and Grass-mowers ..	20

The Wheat to be cut grew on a moderately even table of land, with a gradual ascent and corresponding fall; the corn was drilled or sown from north to south, and the machines were driven from west to east, and from east to west. There was nothing unusual in the crop; it was generally standing, and might be fairly estimated at 36 to 38 bushels, with a full average of straw, in a good state as to ripeness for cutting, which is material in reaping either by manual or horse power. The Barley crop was in all respects similar, except that it had not arrived at an equal state of ripeness. The seeds among it were a full plant, and of great height in many places, though the crop was a moderately fair average one.

The trial of the Grass-mowing machines being fresh in the recollection of the Judges, it was decided to commence proceedings with Class III., consisting of Combined Reapers and Grass-mowers. In reporting on this department, it may suffice to express a doubt whether the object sought by this combination will ever be economically attained,—a doubt which the machines tested on this occasion only confirmed; the work done by them as Reapers being so unsatisfactory, that we felt bound to withhold the Prize.

Attention was then directed to the Reapers in Class II., with manual delivery. The competitors were Messrs. Kearsley; Picksley, Sims, and Co.; Spencer, Wray, and Son; Cuthbert (two-horse), Cuthbert (one-horse), Burgess and Key; Beckwith; Sawney; and Coates.

After a preliminary trial, five machines were selected to be further tested; and these were again reduced, on closer investigation, to two—those of Messrs. Picksley and Sims, and the Messrs. Cuthbert. The final struggle lay between these two, and the result was an award of 6*l.* to the machine of Picksley and Sims; and of 4*l.* to that of Messrs. Cuthbert.

Messrs. Picksley and Sims' Reaper is remarkably ingenious, very simple in its working parts, and has the great recommendation of requiring comparatively little horse power in proportion to the work done. The horses attached to it walked at a regular working speed, and *would have kept on continuously throughout the day without distress.* There is this to be said, however, of all machines made for manual delivery, that if they meet with a full crop of corn, they can only take a proportionately reduced width, and under any circumstances the work for the attendant who throws off the sheaf is most laborious. Practice may do something to mitigate this, but after all it will be very hard work. These machines will perhaps be found most serviceable on ridge-and-furrow land, and on occupations where the inclosures are small, and the advantages derived from self-delivery are less; for such use they deserve our attention.

The machine of Messrs. Cuthbert is well constructed, of great strength and durability, and does its work exceedingly well, with a perfect level cut. It is also simple in its working parts and easy of adjustment; the strain upon the horses, however, is such as could not be supported continuously, assuming the crop to be good, and the professed width to be taken; nor could the attendant bear up under the excessive fatigue required to clear the machine, even were he to resort to making the sheaves much larger than they ought to be.

It should always be borne in mind that the question is not which implement can do the most in one hour, but which will have accomplished the most at the end of a working day of ten hours with the least expenditure of power. Every practical farmer who is alive to the cost of maintaining a team of draught horses in efficient working order, will undoubtedly be guided by this principle in making his selection.

The business of the Meeting was brought to a conclusion by the trial of the machines in Class I., viz.: For Reapers with self-acting delivery. In this Class there were eight competitors; The Trustees of W. Crosskill with a three-horse implement; Messrs. Burgess and Key's two-horse; Cranston's two-horse; Lord Kinnaird, Messrs. Creaser, Kearsley, Prentice, and Hellard, with one-horse machines.

TABLE of Results obtained in the Trial of REAPING MACHINES at Garforth, near Leeds, August 23, 1861.

Exhibitor's Name	Stand.	Article	Width of Cut	Length of Cut	Quantity Cut in Square Feet.	Time in Cutting	Draught in Lbs.	Speed of Horses		Units of Power expended to do the Work	Units of Power to cut 1 Square Foot	Quantity the Machine would cut in Acres per Hour.	Horse-power.
								In Feet per Minute	Miles per Hour.				
			ft. in	feet		min sec							
Burgess and Key ..	44	491	5 8	702	3977·95	3 0	442·25	234	2·602	310459·5	78	1·8284	3·138
Trustees of Crosskill	41	402	8 3	702	5791·5	3 0	416·17	234	2·602	292157	50·44	2·659	2·95
Picksley and Sims .	108	1254	5 3	702	3685·5	2 35	206	271·77	3·088	144612	39·2	1·965	1·696
Cuthbert	35	321	4 5	702	3100	2 50	264·83	248·05	2·813	185910	59·97	1·509	1·99

Remarks.—The above results were obtained during the time each machine traversed 702 feet, the length of the field. The machine, with automaton side-delivery, exhibited by Crosskill's Trustees, was well made, both in respect of workmanship and materials; it was found light in draught, and the arrangement for working three horses abreast made the machine more manageable. It is not, however, well adapted for "ridge and furrow land," and is still difficult to turn at the headland In large fields with few furrows it will be found a very effective implement, that will do a great deal of good work.

The machine with side-delivery exhibited by Burgess and Key was well made, with good material and workmanship; it was very manageable, could be turned easily at the "headland," and worked over "ridge and furrow" without difficulty. The draught may be lessened by yoking the leading horse in such a manner as to counteract the side-strain of the machine.

The machine, without automaton-delivery, exhibited by Picksley and Sims, was made with fair workmanship and materials, the arrangement of the working parts was good, and the whole worked easily, with light draught to the horses. The machine seemed well adapted for small occupations, and in cases where the automaton-delivery is not required.

The machine, without self-acting delivery, exhibited by Cuthbert, was somewhat similar to the foregoing, but the arrangement of the parts was not so good, and the machine worked heavier in consequence.

C. E. AMOS.

These Reapers possessed various degrees of merit; the result, however, left no doubt that the most efficient machines were those of Messrs. Burgess and Key, and of Crosskill's Trustees; these two were therefore again brought out in competition with each other, and every means was taken to ascertain their comparative value. They were also subjected to a dynamometrical test, and after a careful review of all the circumstances of the trial, and a full discussion of every point relating to crop, situation of land, draught required, ease of working and adjustment, simplicity, durability, first cost of machine, delivery, cut, waste made, and work performed, the prize was divided in the proportion of 14*l.* assigned to W. Crosskill's Trustees, and 6*l.* to Burgess and Key.

The tabular statement of the results obtained by the dynamometer is appended to this report, and it is needless to say that this statement materially influenced the decisions arrived at; it will not be requisite to enter minutely into the other scientific considerations which were rightly included in this inquiry; this could only lead to a disquisition which, though tending in some degree to rescue the judges from the charges of ignorance and incapacity sometimes brought against them, would be of little importance to the farmer in search of the best implement.

Great progress has undoubtedly been made towards perfecting the Reaper; more may possibly be done to secure lightness of draught, simplicity and durability of working parts, with continuous action. As it is, it is difficult to conceive how any operation can be more exactly or beautifully performed. It may, perhaps, be urged that the requirements of every crop, or the vicissitudes to which it may be liable, are not yet thoroughly met; but crops, in such a state and of such a bulk as the Reaper is best able to deal with, are precisely those which all farmers desire to grow, for when quantity and quality are united in the crop, then alone does good husbandry meet its reward.

In using the Reaper it should be remembered that should bad weather come on, the risk of damage to the crop is quite as great as if it had been reaped with the sickle, and every precaution that can be devised, *consistent with condition*, should be taken to reduce this risk. Means also should be at hand to repair any trifling accident or breakage in the gearing of the horses, or in any of the working parts of the machine itself.

Mechanical invention, as applied to agriculture, has attained no greater triumph than in the production of the Reaper; and when we contemplate the probability that year by year a greater portion of the harvest will be brought down by its use, the labourer may rejoice at the prospect of a respite from some portion at least of those continuous and excessive efforts which are required of him in mowing a heavy crop of corn. Without instituting a comparison between the cost of hand-labour and machines for cutting corn, we would remark that every practical invention in mechanics has a direct tendency to increase the leisure of man, and enable him to provide for his wants more completely, and with less laborious exertion. Those who recognize this truth will not be slow to admit another of not less importance, viz., that in spite of temporary and accidental derangements, duty and profit generally go hand in hand, whilst a selfish policy is generally a shortsighted one—considerations of importance, both to farmer and labourer in respect of the changes introduced by new machinery.

Nothing now remains for us but to express our obligations to the exhibitors for the kind assistance afforded us by explanations of the working parts and minutiæ of their respective machines; to Mr. Caldwell and Mr. Torr we are most particularly indebted for several valuable hints in the right conduct of the trial. Mr. Amos also was indefatigable in his endeavour to obtain accurate results with the dynamometer.

The weather interrupted our proceedings after 1 P.M., on Thursday, but we found a most hospitable asylum from the rain under the roof of Mr. Fox, the President of the Darlington Farmers' Club; and the few hours spent with him and the other members of that distinguished body will long be held by us in remembrance in connexion with the meeting of the Royal Agricultural Society of 1861.

JOHN HICKEN, Bourton-on-Dunsmore, near Rugby.
G. M. HIPWELL.
W. TINDALL.

Report of the Judges of Steam Cultivators.

Of the sum appropriated to prizes for steam cultivation, 100*l.* was assigned to Class I. for the general application of steam power to the cultivation of the soil; and 100*l* to Class II., in which the limitation was prescribed that the plough or cultivator was to be worked by an ordinary portable engine not exceeding 10-horse power.

Our trial of the implements entered in Class I. commenced on the 2nd July, upon a farm in the occupation of Mr. Brady Nicholson, of Stourton Grange, and on land which is here considered light, but is only relatively so. On some of this land it would have been good work for three horses to plough a furrow six inches deep and of proportionate width; whilst the lightest parts would, at all times, give quite draught enough for a pair. Moreover, in many places the limestone rock lies very near the surface, and offers great obstructions to deep cultivation.

The first field selected contained about 32 acres. It had, in the previous year, been cropped with turnips, which had been eaten off by sheep, and, excepting a slight scarifying and harrowing to keep down the weeds, the land remained in the same consolidated state as when left by the sheep. This field was thought to be well suited for the preparation of a seed-bed for a supposed crop of spring wheat or barley; and the competitors were directed to do the work in the way they thought best adapted to their respective implements. Plots of 4 acres were allotted to each; and in order to test their capabilities of finishing fields without trespassing on adjoining roads or land, the exhibitors were requested not to allow their engines or any part of their apparatus to be placed beyond the prescribed boundaries.

Plot No. 1 was drawn by Messrs. Howard. The implement used was their double-action five-tined steam cultivator, which is worked backwards and forwards across the land by a windlass with reversing gear, so that turning at the end of the lands is unnecessary. At the first operation, a depth of about 5 inches was attained, but on removing the displaced soil it was evident that the land was only partly stirred, the cleared surface presenting a series of narrow unmoved ridges, the cultivator being furnished with only narrow spud-points. Messrs. Howard, however, do not profess that one operation perfects their work, which requires to be crossed again at right angles. The cross cultivation in this instance was necessarily slow; the plot of land being narrow, about one-fourth of the time was consumed in stopping and re-starting the implement. When the cross-cultivation was completed, the surface of the land was well stirred; a depth of 6 or 7 inches was generally attained, but the bottom still presented the same ridged appearance as before. The chief objection to this implement is, that the wheels pass over the land after it is cultivated, and by their pressure make a deep seam; this not only renders sowing or drilling the seed at a uniform depth without a previous harrowing, impracticable, but also replants any couch-grass or other weeds previously brought to the surface. With this exception, the land was left in a good state for fallow, and could have been soon reduced by a harrow and roll to a fine and deep seed-bed. The headlands were cultivated twice over, but necessarily each time in the same direction.

Plot No. 2 was drawn for Mr. Wilson, of Wansford, Northamptonshire, who exhibited a six-horse power double-cylinder engine, manufactured by Messrs. T. and J. Law, of Leicester, with windlass, anchors, snatchblocks, and cultivator, made upon the plan of Mr. Smith of Woolston. The engine boiler was, however, so badly stayed that it was deemed unsafe by the engineers, Messrs. Amos and Owen, and was, on that account, not allowed to work. The Judges would gladly have worked the Woolston apparatus by another engine, but when this set of tackle was again enquired for, it could not be found. They very much regret that they were thus prevented from comparing the merits of this and other modes of cultivation.

Plot No. 3 was assigned to Messrs. Roby and Co., of Lincoln, who exhibited a very good 12-horse power, double-cylinder, self-propelling engine, having Chandler and Oliver's patent drum-ploughing windlass attached, so as to revolve on its hind travelling axle; together with snatchblocks, anchors, rope-porters, and 1200 yards of steel wire rope, intended to work a three-furrowed plough. In consequence of the anchors giving way repeatedly, and of the plough breaking, it was impossible to record any facts in favour of this entry. The plough was heavy and unmanageable, requiring an enormously wide headland on which to get in and out of work. The work done in this case was fair. To the engine and windlass, which was simple and efficient, a medal was awarded.

Next in order, upon plot 4, came Messrs. Richardson and Darley, of Kirton-in-Lindsey, Lincolnshire, with a steam traction engine, and a windlass invented by Mr. Beard, of Stowe Park, and manufactured by the exhibitors. They commenced working by driving the engine up and down the land, with a two-furrow plough attached to it by a chain. The engine was difficult to steer, and its passage over the land was thought likely to do as much harm, generally, as the plough would do good. The exhibitors argued that the consolidation was beneficial. This may be true on some soils when intended for a crop of wheat, but at all events the pressure should not be so unequally distributed as it was in this case, and should take place after, instead of before the ploughing. The engine was subsequently made stationary, and the plough was worked by a wire rope and Beard's windlass. Part of the land was now ploughed exceedingly well, in breadths about ten yards wide, leaving deep open furrows between them. One of the main advantages of steam cultivation —that of doing away with the loss occasioned by open furrows—is thus frustrated. No small exertions were also required to turn the plough at the land's end. This method of working is, besides, attended with great loss of power and wear of rope, as it can only employ rope-porters on one line of rope, the other dragging continuously on the land. The labour employed, in proportion to the work done, is also excessive; and the whole system the reverse of economical.

The loss of power above referred to is best illustrated by the results of the following experiment: 450 yards of wire rope, weighing 2 lbs. per yard, were attached to a dynamometer, and drawn upon the unploughed turnip land without the intervention of rope-porters, when the draught recorded was 527 lbs. The same rope, drawn upon a sufficient number of rope-porters to keep it clear of the ground, showed a draught of 57 lbs only.

Plot 5 was drawn by Mr. Fowler, who very quickly brought his large engine and tackle into operation. He commenced working with his so-called "digger." This implement is Fowler's plough, but fitted with the Cotgreave mouldboards instead of the ordinary ones. This threw over and, to a considerable extent, pulverised the soil as completely as if dug with a spade. It left, however, rather a rough surface for a seed-bed, and when about half the plot had been so tilled, Mr. Fowler was requested to scarify the remainder. This cultivation was preferable in many respects to the other. The surface was finer in consequence of the soil (already pulverised by the previous superficial tillage) not being buried, whilst any grass or weeds were kept on the surface, where they would easily be destroyed by subsequent operations. The first two acres were stirred uniformly to the depth of 7 inches; of the latter or scarified portion, fully one-half had been only stirred 5 inches deep, but, at the request of the Judges, a depth of more than 7 inches was again attained. Over the whole of the four acres a large harrow was attached to the side of the implement, which produced the usual good effect of one harrowing by horses, without the disadvantage arising from the treading of their feet. On light soils the drill might immediately follow the scarifier; even on more tenacious soils, if cultivated in fine weather, a very slight amount of drying would suffice to make the land ready for sowing. The ploughing of the headlands occupied much more time, in proportion to their extent, than the main piece. This was partly owing to an attempt to plough that which the engine had travelled over, and consequently consolidated, by means of an ordinary claw-anchor and snatchblock. As these were unable to bear the strain upon them, the plough was only worked one way. It may be questioned whether it is not more economical to plough the headlands by means of horse-power, much time being lost in shifting tackle for such small areas.* This remark applies particularly to the further headland, to plough which the engine must be removed across the field. That which is traversed by the engine, and consolidated by it, is more easily dealt with, and it is of more importance that steam should be brought to bear in breaking it up.

Upon the whole the land was quite as effectually tilled at one operation by Mr. Fowler, as by the Messrs. Howard at two, the bottom being uniformly level, and all the soil perfectly moved.

Messrs Brown and May, of Devizes, worked Romain's rotary cultivator, or "digging machine," on plot 6. The work done, though but little, was certainly the best in the field, the soil being finely pulverized to the depth of 7 inches; but the expenditure of coal, oil, and water was something fearful. This cost, coupled with the wages of the men, the wear and tear of the implement, and the interest of capital invested in its purchase, would very far exceed the value of the work. This was so small in amount, and done at such various times, that it was impossible to chronicle the details of the trial. The digger worked first round the outside of the plot of ground, narrowing its orbit as it approached the centre. Considerable spaces at each corner were left untouched; nor do we see how the centre, had the digger ever reached that point, could by any possibility have been finished by so ponderous a machine, requiring so large a space in which to turn. However highly we may appreciate the work, we consider we should have committed a great error had we given either a medal or a commendation to an implement in every way so costly.

After the foregoing trials, it was evidently unnecessary to require any of the competitors, except Mr. Fowler and Messrs. Howard, to proceed further. To each of them eight acres of clover-ley were further allotted, which they were requested to plough as a seed-bed for wheat.

Mr. Fowler's plough worked well, and, considering the rapidity at which it travelled, the furrows were well and evenly turned. Of course the slower ploughing is done (within certain limits) the less the furrow-slices are broken, and the more neatly they are placed. Had skim-coulters been attached to the plough, so as to bury all the clover, the ploughing would have been of a very superior order; but such an addition to steam ploughs would probably add more to their complexity than to their utility. As it was, the ground was left in a very good state for harrowing,—indeed all the better in that respect from the furrow-slices having been more or less broken.

The work done by Messrs. Howard's plough was also pretty good. The furrow-slices were perhaps better cut, and rather better shaped, but they were not

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* In this case twenty-six minutes were occupied in shifting tackle for the nearer headland, and forty minutes for the farther one.

EXPERIMENTS MADE WITH AN ORDINARY PLOUGH ON THE HEAVY LAND.

Number of Experiment.	Distance Ploughed in Yards	Size of the Furrow-slice.	Time occupied	Velocity in Yards per Hour	Stress on Draft-hook in lbs.	Portion of Field experimented on.	Direction of Motion	Average Inclination of Slope	Reading of Dynamometer	Mechanical effort required to do this Work in Horse-power	Remarks.
		depth width	min sec.		lbs						
1	100	7 × 10½	2 10	2770	738	Centre	Up-hill	$1\frac{5}{8}$ in 36	29·	3·09	Tried in centre of the field, near the trees.
2	100	7 × 10½	1 50	3272	676	,,	Down	,,	26·55	3·3	
3	50	5½ × 7	0 50	3600	657	Bottom	Up	$1\frac{1}{4}$ in 36	12·9	3·58	Tried on the land near the entrance of the field.
4	50	5½ × 7	0 34	5294	440	Centre	,,	,,	8·65	4·21	
5	50	6 × 9	0 40	4500	420	Top	,,	,,	8·25	2·8	
6	50	6 × 9	0 38	4736	509	Centre	,,	,,	10·	3·65	
7	50	6 × 9	0 38	4736	738	Bottom	,,	,,	14·5	5·3	
8	50	7 × 10½	0 36	5000	514	Top	,,	,,	10·1	3·89	
9	50	7 × 10½	0 35	5142	1023	Bottom	,,	,,	20·1	9·4	
10	50	7 × 10½	0 38	4736	652	Centre	,,	,,	12·81	4·68	
11	50	8 × 12	0 40	4500	757	Top	,,	,,	14·87	5·16	
12	48	8 × 12	0 50	3456	1060	Centre	Down	,,	20·	5·55	Adjoining Fowler's last furrow.
13	50	8 × 12	0 48	3750	898	,,	,,	,,	17·65	5·1	
14	..	8 × 12	..	..	..	Bottom	,,	,,	..	..	Whippletrees broken; experiment then discontinued.

not so equal in size, and consequently not so evenly laid, and would have required a greater amount of harrowing to produce the same tilth. The ploughs being placed in a frame upon four wheels, and the whole being necessarily a great weight, it seemed no easy matter, even to experienced men, to set it into its work at the land's end, and strong levers had often to be resorted to.

Fowler's plough, on the contrary, being balanced on two wheels, was very easily guided into the unploughed land.

In order to test the capabilities of Mr. Fowler's apparatus on fields having irregular boundaries and uneven surfaces, it was set to cultivate a piece of land in the field previously cropped with turnips, which was nearly triangular in shape, and had upon it an old stone quarry of considerable depth. This land was, however, broken up with the "digger" 10 inches deep in a first-rate manner.

This completed the trials in Class I. on the light land. The next experiments were on a field of very stiff soil, in the occupation of Mr. Furness, the lower part of which was of a tough and tenacious character, such as is very rarely met with. Higher up the field the soil was more friable, but very hard and stubborn. It was a rye-grass and clover layer, which had been eaten off by sheep, and had been laid up in narrow lands, with deep furrows intervening. It presented, on the whole, a more severe test than these implements had ever been subjected to, when competing for prizes offered by the Royal Agricultural Society. To each of the two competitors six acres were allotted, with directions to plough one half, and break up the other with a scarifier.

Mr. Fowler ploughed the first half of his plot in a first-rate manner, and, considering the depth attained and the character of the soil, with considerable rapidity. But on lands so narrow, with furrows so deep, it was impossible that the whole should be ploughed at a uniform depth, or laid at one uniform angle, by a set of four ploughs attached to a rigid frame. Owing, however, to the facilities possessed by Mr. Fowler for raising or lowering the wheel on either side of his ploughs, even when in motion, a greater uniformity of depth was attained than could reasonably have been expected.

In order to test the resistance the ploughs had to contend with, one of Messrs. Hornby's single-wheel ploughs was attached to a dynamometer, and drawn by four strong horses; the results given are recorded in the previous table (p. 465).

Mr. Fowler broke up the remainder of his piece with the same implement, but substituted scarifying breasts for the common mould-boards. The ploughshares cut all the land to a depth of from 7 to 8 inches, and left an even bottom. The surface was all the more broken from the coulters being so set that each furrow-slice was cut in two. Thus, with the aid of the prongs on the top of the short mouldboards, the land was well torn to pieces, and left in an admirable state for subsequent fallowing. It may be remarked as a slight defect in the work that a place is not cleared in the furrow for the passage of the wheel on the return of the implement. The result is that a small part of the surface is again compressed, on which if any couch-grass be lying, it would be replanted.

The Messrs. Howard's plough was altogether a failure on the narrow lands of this field. This is attributable to the wheels which regulate the depth of the furrow not being readily altered to suit the inequalities of the surface. The result was that the land was only partially ploughed, and at very unequal depths, the bottoms of the old furrows being rarely touched. This plough is only suited for a level surface, and requires land of this kind to be previously levelled by steam or other cultivation. After having gone over about half an acre, it broke, and the scarifier was then substituted. With this implement the land was by no means all moved, nor was the depth attained at all uniform. The bottom presented the same series of small ridges as elsewhere, and it was evident that

CLASS I.

TABLE I.—GENERAL COMPETITION ON FALLOW FIELD.

Name.	Price.	Average Pressure of Steam	Nominal Horse-power	Total Fuel Burnt			Time occupied		Quantity of Land operated on			Description of Work.	Depth.	Cost of Work per Acre		Manual Labour per Day.		Wear, Tear, and Interest, per day.	
	£	lbs.		cwts	qrs	lbs	H	M	A	R	P		inches	s	d.	s	d	s	d.
*Howard .	610	73	10	10	2	8	10	35	4	0	0	Cultivation of light-land fallow field.	5	11	8	16	2	12	2
Fowler .. .	825	82	12	7	3	6	4	14	3	1	36		7	6	5	11	6	14	6
,, ...	,,	,,	,,	1	1	18	1	5	0	2	4	Headland on do.	,,	..		..			
Richardson .	485	..	.	.					..				5½	.		..			
Robey . .	650	.	12	.					.			Cultivation of light-land fallow		..		..		..	
Wilson . ..	350	..	6	.					.					.		.		.	
Brown & May	800	.	.	..									7	..				..	
Howard ..	610	66	10	14	2	19	14	19	7	2	14	Ploughing clover-ley	5	8	2	16	2	12	2
Fowler . ..	825	75	12	10	3	0	9	12	7	2	5	,, ,,	7½	5	2	11	6	14	6
Howard ..	,,	,,	,,	1	0	2	1	58	0	1	26	Headland	6	18	5	.		.	
Fowler . .	,,	,,	,,	1	0	14	0	44	0	1	27	,, . ..	7½	8	0	..			

Note.—The work done by Messrs. Richardson and Co., and Brown and May, was at such various times, that no account could be taken of time or coals.

* Cultivated and cross-cultivated.

that to make this tillage at all perfect the cultivator must recross its work. It is therefore again shown that this implement requires to go twice over the land to produce the same results as are produced by that of Mr. Fowler at a single operation. This, we need hardly observe, is a very serious objection to it.

We have stated above that on this very stiff soil Mr. Howard's plough was broken. The same accident occurred twice to Mr. Fowler's—once against the stump of an oak tree left in the ground, and again from contact with a large stone firmly imbedded in the stiff clay. We attribute no blame to the implements; for breakage of some kind was, under the circumstances, inevitable, unless the plough and tackle could resist a greater strain than the engine could exert. But this was not the case, and we record the facts chiefly with the view to calling the attention of engineers to them, in the hope that they will be able to devise some remedy for an evil which may at any time occur, adding thereby greatly to the cost of repairs, and to the average cost of the work done, by reason of time lost on such occasions.

This was the conclusion of the trials to which the steam cultivators of the first class were subjected. We have purposely avoided burdening these remarks with records of the time and coals consumed, cost of labour, &c., feeling assured that the reader will more easily obtain the required information on these points by reference to the subjoined tables.

CLASS I.—STEAM CULTIVATORS ON HEAVY LAND.

Name.	Average pressure of Steam.	Total Fuel burnt			Time occupied		Quantity of Land operated on			Depth in Inches	Manual Labour per Day		Wear & Tear, Interest, &c.		Cost per Acre.	
	lbs.	cwts	qrs.	lbs	H	M	A.	R	P		s	d	s	d.	s	d
FOWLER—																
Ploughing	76	7	0	0	5	0	2	3	21	8	11	6	14	6	7	10
Scarifying	,,	6	1	26	4	41	2	3	29	7	,,		,,		7	2
HOWARD—																
Ploughing	70	1	1	17	1	56	0	1	33	5	16	2	12	2	17	2
Scarifying	,,	10	0	1	8	12	5	2	19	5½	,,		,,		6	8

CLASS I.—*Cost of* FOWLER'S *Apparatus on 4-acre piece of Light Land, fallow.*

	Cost per Day. £.	s	d.
1 anchorman	0	2	4
1 engineman	0	3	4
1 ploughman	0	3	4
2 porter-boys, at 1*s.* 3*d.*	0	2	6
Total cost of manual labour	0	11	6
Water carting	0	4	0
Oil	0	1	0
Interest on purchase-money, 825*l.*, at 5 per cent. per annum, and wear and tear, at 12½ per cent. = 144*l.* 7*s.* 6*d.*, divided among 200 working days, or per day	0	14	6
	1	11	0
Coal consumed per day, 17 cwts. 12 qrs. 10 lbs., at 20*s.* per ton	0	17	4
Total cost per day	£2	8	4

Total cost per day when cultivating the turnip-land or fallow = 2*l.* 8*s.* 4*d.*
Quantity of land worked per day of 10 hours = 7A. 2R. 4P. = 7·53 acres.
Cost per acre, 6*s.* 5*d.*

CLASS I.—*Cost of* HOWARD'S *Apparatus on 4-acre piece.*

	Cost per Day		
	£.	s.	d.
2 anchormen, at 2s. 4d.	0	4	8
1 engineman	0	3	4
1 breaksman	0	2	4
1 ploughman	0	3	4
2 porter-boys, at 1s. 3d.	0	2	6
Total cost of manual labour	0	16	2
Water-carting	0	4	0
Oil	0	1	0
Interest on purchase-money, 610*l*., at 5 per cent. per annum, and wear and tear, at 15 per cent. = 122*l*., divided among 200 working days, or per day	0	12	2
	1	13	4
Coal consumed per day, 9 cwts. 3 qrs. 26 lbs., at 20s. per ton	0	10	0
	£2	3	4

Total cost per day when cultivating the turnip-land or fallow = 2*l*. 3s. 4*d*.
Quantity of land worked per day of 10 hours = 3A. 3R. 4P. = 3·78 acres.
Cost per acre 11s 8*d*. on the 4-acre piece, for cultivating and cross-cultivating.

CLASS I.—*Cost of* FOWLER'S *Apparatus on Clover-ley*—8 acres.

	£.	s.	d.
Manual labour, wear and tear and interest, &c.	1	11	0
Coals, 11 cwts 2 qrs. 19 lbs. per day, at 20s.	0	11	8
	£2	2	8

Total cost per day, 2*l* 2s 8*d*
Work done per day, 8A. 32P.
Cost per acre, 5s. 2*d*

CLASS I.—*Cost of* HOWARD'S *Apparatus on Clover-ley*—8 acres.

	£.	s.	d.
Manual labour, wear and tear and interest, &c., as before	1	13	4
Coals, 9 cwts. 2 qrs. 13 lbs. per day, at 20s.	0	10	3
	£2	3	7

Total cost per day, 2*l* 3s. 7*d*.
Work done per day, 5A. 1R. 6P.
Cost per acre, 8s. 2*d*.

CLASS I.—*Cost of* FOWLER *on the Headland of the* 8 *acres.*

	£.	s.	d.
Manual labour, interest, wear and tear, &c., as before	1	11	0
Coals, 11 cwts. 2 qrs. 20 lbs.	0	11	8
Total cost per day	£2	2	8

Land worked at per day, 5A. 3R.
Cost per acre, 8s., apart from time occupied in removals.

CLASS I.—*Cost of* HOWARD *on the Headland of the* 8 *acres.*

	£.	s.	d.
Manual labour, interest, &c. &c., as before..	1	13	4
Coals..	0	5	2
Total cost per day	£1	18	6

Land worked at per day, 2A. 0R. 14P.
Cost per acre, 18s. 5d.

CLASS I.—*Cost of* FOWLER'S *Apparatus on Heavy Land.*

PLOUGHING.

	£.	s.	d.
Manual labour, wear and tear, interest, &c., as before	1	11	0
Coals consumed per day, 14 cwts., at 20s. . .	0	14	0
Total cost per day .. .	£2	5	0

Land ploughed per day, 5A. 3R. = 5·762 acres.
Cost per acre, 7s. 10d.

CLASS I.—FOWLER'S *Apparatus on Heavy Land.*

SCARIFYING.

	£.	s.	d.
Manual labour, water, oil, wear and tear, interest, &c., as before	1	11	0
Coals, 13 cwts. 3 qrs. 10 lbs , at 20s. . .	0	13	10
Total cost per day	£2	4	10

Land scarified per day = 6A. 1R. = 6·25 acres.
Cost 7s. 2d. per acre.

CLASS I.—HOWARD'S *Apparatus on Heavy Land.*

PLOUGHING.

	£.	s.	d.
Manual labour, water, oil, wear and tear, interest, &c., as before	1	13	4
Coals, 7 cwts. 1 qr., at 20s	0	7	3
Total cost per day	£2	0	7

Land ploughed per day, 2A 1R 17P. = 2·4 acres.
Cost per acre, 17s. 2d.

SCARIFYING.

	£.	s.	d.
Labour, &c. &c., as above	1	13	4
Coals, 12 cwts. 23 lbs., at 20s.	0	12	4
Total cost per day	£2	5	8

Land scarified per day, 6A. 3R. 14P. = 6·84.
Cost per acre, 6s. 8d.

We come now to Class II., perhaps the most important class of steam cultivators, for it is highly desirable that the ordinary agricultural engines, when of sufficient power, besides thrashing the produce of the farm, should be available also for the cultivation of its soil.

We began by allotting to each implement 3¾ acres of a layer of trefoil and white clover, which had been grazed with sheep. The land was to be scarified to the depth of 6 inches.

The first to commence was Mr. Hayes, of Watling Works, Stony Stratford, in connection with Messrs. Crowley and Son, of Newport Pagnell. The former was the manufacturer and exhibitor of a very good 10-horse power engine, and of a patent self-acting windlass. Both these were well made, and to the latter, which showed some ingenuity, a medal was awarded. The scarifier, anchors, and snatchblocks were the production of Crowley and Son. They were far too light, and not at all adapted for steam cultivation. The surface was pared very imperfectly to the depth of about 3½ inches, but in that part of the field where this implement worked the rock was so near the surface that no very great depth could be attained; but on being tried on the turnip-field, where there was a sufficient depth of soil, it was not much more successful.

Mr. Kirby, of Banbury, came next, with an 8-horse power double-cylinder engine, a Beard's windlass, and a two-furrow plough, manufactured by the exhibitor. Mr. Kirby had no scarifier, and the plough was that used by Messrs. Richardson and Co. in the first field. The ploughing was well done, but the objections made in Messrs. Richardson's case apply equally to this: an 8-horse engine, working at 10-horse power, and six men, were doing the work of six horses and three lads.

Mr. Fowler next commenced with an ordinary 8-horse power portable engine, made by Messrs. Clayton, Shuttleworth, and Co., by which a stationary windlass was driven, to which was attached a clipping-drum of similar construction to those appended to his large engines, but carried upon a separate pair of wheels. The anchors and ploughs were the same as those already noticed, the latter being fitted with the same short mouldboards as were used on plot 5, in the first trial, Class I. This implement made very good work, and the soil was all cut to a depth of 7 inches. Great masses of solid limestone rock were riven off without any apparent injury to the plough. Owing to the coulters being set in a line with the point of the shares, the surface was not quite so much broken as in the case described in the strong-land field, and did not therefore present quite so well-cultivated an appearance.

The last competitors in this part of the trials were the Messrs. Howard, with the same cultivator as was first used, but working with three tines only instead of five. The plot of 3¾ acres was broken up at the depth of 4½ inches, in little over 4¼ hours, at an expenditure of 635 lbs. of coals. The soil moved was well divided, and, as broader points were used, a more level bottom was obtained. This may be considered the best performance of the Messrs. Howard, and their cultivator is well adapted for light soils with a level surface; but if the weight of the soil moved by their implement could be compared with that moved by Mr. Fowler's, they would suffer very greatly by the comparison. If we could have applied that test, our decisions would doubtless have been greatly strengthened by it.

The race for this class being again reduced to Mr. Fowler and the Messrs. Howard, they were each ordered to plough 6 acres of clover-ley in the above light-land field, but upon a part where a deeper staple prevailed.

Mr. Fowler worked a four-furrow plough, 6 inches deep, and completed his task in 7 hours 44 minutes, to the surprise of all who witnessed the performance. We may here remark, however, that during all the trials the governors of the engines were dispensed with, and engines and men went throughout at a racing pace. The furrows in this case were clean cut and well turned, and lay well for the action of the harrows.

Messrs. Howard used a 10-horse engine, and the same three-furrow plough. At the commencement the work was similar in character to that made when ploughing Class I.; but towards the conclusion there was great irregularity in the width of the first furrow in each series, from 15 to 18 inches being attained in many instances.

The remaining trials in Class II. took place in the field of strong land.

Messrs. Howard's plough having been broken during the trials in Class I., they were obliged to scarify the plot of clover layer assigned to them in this Class. This they did pretty well, but the depth was by no means great, nor was the land all moved, especially in the furrows.

Mr. Fowler ploughed a small part of his plot, and scarified the remainder in the same manner as that done with the large engine. All the soil was moved to a depth of 7 inches, and the surface was well divided.

The next performance of the implements in this Class was to cross the work of the large cultivators in the heavy-land field. This was done very well by both implements, but in neither case could they do much to the furrows, unless the land had been well cut at the previous operation. However, the cultivator of Messrs. Howard moved very rapidly over the ground in this crossing, and well stirred an acre per hour.

Both Mr. Fowler and Messrs. Howard had a field allotted them to cultivate in what manner they pleased. Mr. Fowler ploughed with his "digger" 11A. 2R. 14P., at the depth of fully 7 inches, in just 12 hours, burning 18 cwt. of coals. This work was executed in capital style, the whole field being ploughed straight away without any interruption, except a small stoppage occasioned by the ropes having to be shifted round a tree. Mr. Fowler ploughed up the headland adjacent to the engine, but did not attempt the further one, on account of the harm which the engine would have done in moving up the field.

This field was in some parts a stiff clay, in some inclined to a peaty loam, whilst in others the coal measures and shale cropped out. Considering the variation of the soil, the depth of the ploughing may be called uniform, and the soil well thrown over and left in capital order.

Messrs. Howard cultivated 10 acres in a little over 9 hours. The land was well stirred, and all the grass and root weeds left on the surface. On the upper part of the field the clay was stiff and intractable; here three tines were used. On the lower portion it was almost all peat, and on this soil the cultivator had five tines. Messrs. Howard's ropes were not long enough for the field, and so a portion of it had to be cultivated the shorter way, but all the headlands were scarified.

No particulars have been recorded in our tables of the cost of setting down, taking up, and shifting tackle, to plough headlands. During the trials, however, account was taken of the time thus occupied, but the work done was not charged with it. The engines and implements being all in the fields in which they were to work, and not removed after finishing the plots assigned to them—being also in the hands of men of more than common experience, and fully on the alert—the results obtained are no reliable guide as to the probable cost per acre of these operations under ordinary circumstances. This must necessarily depend on the distance to which removals have to be made, the size of the fields to be cultivated, and the wet or dry state of the land to be travelled over. When ploughing the 8-acre piece of clover-ley in Class I., Fowler spent 26 minutes in setting down, 26 minutes in shifting to plough first headland, 40 minutes for the last, and 25 minutes loading up again=1 hour 57 minutes. The cost of this, for labour alone, on the 8 acres was about 4*d*. per acre. Messrs. Howard on the corresponding piece were 2 hours 42 minutes setting down, 24 minutes shifting for first headland, 17 minutes for the second, and 20 minutes loading up=3 *hours* 43 *minutes*, costing in labour 9*d*. per acre. In neither case is any charge made for time lost and fuel consumed in getting up steam, the time lost by the engines, nor the assistance given by the use of horses. In this class Mr. Fowler had an advantage over his opponent, but in Class II., with the small tackle, there was no great difference. The costs of removal are much the highest in Class II., at least six horses being required to move the engine and all the apparatus simultaneously. The large engines used

STEAM CULTIVATORS.

CLASS II.—GENERAL COMPETITION ON LIGHT LAND.

Name	Price	Pressure of Steam	Nominal Horse-power	Total Fuel burnt			Time occupied		Quantity of Land operated on			Description of Work	Depth in Inches	Manual Labour per Day		Wear and Tear, Interest, &c.		Cost of Work per Acre	
	£			cwts	qrs	lbs.	H.	M	A.	R	P	Clover-ley		s	d.	s	d	s	d.
Hayes and Crowley	490	45	10	4	2	23	5	7	3	2	31	Grubbing ..	3½	13	8	..		..	
Kirby .. .	378	50	8	7	0	17	12	19	3	3	0	Ploughing ..	5	13	8	7	6	10	5
Fowler ..	592	55—55	8	7	1	4	5	54	3	3	0	Grubbing	7	13	10	10	4	6	6
Howard	495	45—59	10	5	2	19	4	36	3	3	0	,, ..	5½	16	2	9	10	5	3
Fowler	592	55	8	8	3	9	7	44	6	0	4	Ploughing..	7	13	10	10	4	5	2
,,	,,	,,	,,	0	1	17	0	30	0	0	28	Headland ..	,,	..		..		..	
Howard ..	495	45	10	11	0	23	8	53	5	3	21	Ploughing ..	5½	16	2	9	10	6	7
,, .	495	,,	,,	0	1	14	0	36	0	0	28	Headland ..	,,	.		..		..	

CLASS II.—TRIAL ON HEAVY LAND—CLOVER AND RYE-GRASS LEY.

Name	Steam Pressure	Total Fuel burnt.			Time occupied		Quantity operated on			Depth in Inches.	Description of Work	Manual Labour per Day		Wear and Tear, Interest, &c		Cost per Acre	
	lbs	cwts	qrs	lbs	min.	sec	A	R.	P.			s.	d	s	d	s.	d
Fowler	52	1	0	0	0	59	0	1	31	8	Ploughing	13	10	10	4	8	0
,, .	.	6	0	12	4	27	2	3	7	8	Grubbing	13	10	10	4	6	9
Howard .		6	1	2	4	23	3	0	37	5½	,,	16	2	9	10	6	2

used in Class I. are, on the contrary, self-propelling: those of Mr. Fowler not only carried more than half the rope on the drums placed under them, but drew the ploughs and sometimes the rope-porters also behind them. These rope-porters, running on their own wheels, are much more easily conveyed from field to field than those of Messrs. Howard, which must be taken on a waggon or some other carriage. The same remark applies to their respective anchors; those of Mr. Fowler travel on their own wheels, and carry with them, if required, the remaining portion of the rope, the claw-anchor, and snatch-block. In dry weather and for short distances these can be drawn by one horse, the engine, which is steered by the ploughman, taking the other parts of the apparatus. Messrs. Howard's tackle in Class I. cannot, however, be removed without the assistance of at least four horses, viz., one to guide engine, one to draw plough or scarifier, one for windlass and ropes, and one for rope-porters, anchors, snatch-blocks, &c.

The loss of power occasioned by the wire rope running upon the ground instead of over rope-porters has been noticed in reference to the implements of Messrs. Richardson and Darley. To prevent this, Mr. Fowler has made a very simple but ingenious addition to his ploughs, by which the rope is either given out or taken in as may be required. By means of this self-acting slack gear, the rope is always tight upon the rope-porters, and thus one of the most expensive items in steam cultivation—that of the wear and tear of the rope—is very greatly reduced. To prevent the slack rope running too rapidly off their drums, Messrs. Howard and others use friction-breaks, but these cannot be used without loss of power, and in no case so effectively as to entirely prevent the slack rope running on the ground.

It will be observed with respect to Mr. Fowler's apparatus that we have taken off 2½ per cent. from the sum which has been charged under the head of "wear and tear." Most of the steam cultivators have been simplified and improved, but Mr. Fowler's is especially to be commended in this respect. In working his apparatus one-third less rope suffices than is requisite for that of the Messrs. Howard; and, with proper attention to the rope-porters, Mr. Fowler's rope is carried almost entirely off the ground. This, we need scarcely add, is a most important source of economy, which none of his opponents possess.

CLASS II.—*Cost of* KIRBY'S *Apparatus.—Ploughing on Light Land—Clover-ley.*

Manual labour per day, viz :	£.	s.	d.
2 anchormen, at 2*s.* 4*d*	0	4	8
1 engineman	0	3	4
1 ploughman	0	3	4
2 porter-boys, at 1*s* 3*d.*	0	2	6
	0	13	10
Water-cart	0	4	0
Oil	0	1	0
	0	18	10
Interest at 5 per cent. per annum, and wear and tear at 15 per cent. on 378*l.* = 75*l.* 12*s.*, divided among 200 working days, or per day	0	7	6
	1	6	4
Coals consumed per day of 10 hours, 5 cwts. 3 qrs. 12 lbs., at 20*s.*	0	5	10
Total cost per day	£1	12	2

Land ploughed per day, 3A. 3P. = 3·06 acres.
Cost per acre, 10*s.* 5*d.*

CLASS II.—*Cost of* FOWLER'S *Apparatus.—Grubbing Clover-ley—Light Land.*

	£.	s.	d.
1 anchorman	0	2	4
1 man at windlass	0	2	4
1 engineman	0	3	4
1 ploughman	0	3	4
2 porter-boys, at 1s. 3d	0	2	6
Manual labour	0	13	10
Water-cart	0	4	0
Oil	0	1	0
	0	18	10
Interest on cost—592*l*, at 5 per cent per annum, and wear and tear, at 12½ per cent. = 103*l*. 1s., divided among 200 working days, or per day	0	10	4
Cost of manual labour, interest, and wear and tear	1	9	2
Coals per day, 12 cwts. 1 qr. 11 lbs, at 20s	0	12	4
Total cost per day	£2	1	6

Land worked per day of 10 hours, 6A. 1R 16P = 6·35 acres.
Cost per acre, 6s. 6*d*

CLASS II — FOWLER —*Ploughing on Clover-ley—Light-land.*

	£.	s	d
Manual labour, wear and tear, &c &c, as before	1	9	2
Coals consumed per day of 10 hours, 11 cwts 1 qr. 18 lbs., at 20s.	0	11	5
Total cost per day	£2	0	7

Land ploughed per day, 7A. 3R. 4P. = 7·78 acres.
Cost per acre, 5s 2*d*.

CLASS II.—HOWARD.—*Grubbing Clover-ley—Light Land*

	£.	s	d
Manual labour as in Class I.	0	16	2
Water-cart	0	4	0
Oil	0	1	0
	1	1	2
Interest on cost—495*l*, at 5 per cent. per annum, and wear and tear, at 15 per cent. per annum = 99*l*, divided among 200 working days, or per day	0	9	10
	1	11	0
Coals per day, 12 cwts., at 20s.	0	12	4
Total cost per day	£2	3	4

Land worked per day, 8A. 24P. = 8·15 acres.
Cost per acre, 5s. 3*d*.

HOWARD.—*Ploughing on Light Land.*

	£.	s.	d.
Manual labour, &c. &c, as before	1	11	0
Coal consumed per day of 10 hours, 12 cwts. 1 qr. 27 lbs., at 20s.	0	12	6
Total cost per day	£2	3	6

Land ploughed per day = 6A. 2R. 9P.
Cost per acre, 6s. 7*d*.

CLASS II.—*Cost of* FOWLER'S *Apparatus on Heavy Land.*

PLOUGHING.

	£.	s.	d.
Manual labour, wear and tear, interest, coal and oil, as before	1	9	2
Coals consumed per day of 10 hours, 10 cwts 19 lbs., at 20s.	0	10	2
Total cost per day	£1	19	4

Land ploughed per day, 4A. 2R. 2P.
Cost per acre, 8s. 8*d.*

SCARIFYING.

	£.	s.	d.
Manual labour, interest, &c. &c., as above	1	9	2
Coals consumed per day of 10 hours, 18 cwts. 3 qrs., at 20s.	0	13	9
Total cost per day	£2	2	11

Land scarified per day, 6A. 1R 6P. Cost per acre, 6s. 9*d.*

CLASS II —HOWARD.—*Cost of Scarifying on Heavy Land.*

	£.	s.	d.
Manual labour, wear and tear, interest, coal and oil, as before	1	11	0
Coals consumed per day of 10 hours, 14 cwts 1 qr 6 lbs., at 20s.	0	14	3
Total cost per day	£2	5	3

Land scarified per day, 7A. 1R. 19P. Cost per acre, 6s. 2*d.*

The following table explains the composition and cost of Fowler's rope:—

MEMORANDA RESPECTING WIRE-ROPE.

Circumference of Rope.	Nominal Horse-power of Apparatus	Number of Strands	Number of Wires	Gauge of Wires	Weight per Fathom	Weight per Yard	Price per Lb.	Price per Yard.
					lbs	lbs	s d.	s d.
	12	6	6	15	4	2	1 0	2 0
	10	6	6	16	3¼	1·625	0 8	1 1
	8	4	6	16	2¼	1·125	0 8	0 9

In conclusion we beg to remark that the land selected for the trials was in every respect well suited for the purpose. It was so far varied in character as fully to test the power of the engines, the strength of the tackle and implements, and the suitability of the latter for the various operations by which the tillage of the soil is effected. That culture by steam power is destined to supersede that by horse-power to an enormous extent can scarcely be doubted by those who witnessed the trials. On very light soils cultivation may be effected at perhaps as low a price per acre by horse as by steam power; but we think it an error to measure the advantages of the two systems by their direct relative cost. It is the time and manner in which it is done that gives value to the operation; for instance, a ploughing or scarifying during the dry autumnal months, may be of the greatest possible benefit, whereas the same operation in the winter might be a positive injury. But as farmers can never command a sufficient amount of horse power for the busy season, they must then be dependent on the auxiliary power of steam, which is not only the sole auxiliary power to be had, but will also be found the cheapest power, even on light soils, if deep cultivation be adopted. On all well-drained land open furrows will be obliterated. These not only cause a waste, but offer a serious impediment to the well working of reaping and mowing machines. Many other advantages will result from the use of steam cultivators, and we can only regret that the great cost of these implements renders their purchase beyond the means of the great body of the farmers, who, whenever they shall be enabled to hire upon reasonable terms, will, we are quite sure, gladly avail themselves of a power from which they may reasonably expect such great advantages.

WILLIAM OWEN.
OWEN WALLIS.
CLARE SEWELL READ.

AWARDS.

CLASS I.—Stand 33; Article 294; J. FOWLER, Jun.

For 12-horse steam cultivating apparatus suitable for ploughing land of all descriptions £50

For ditto suitable for scarifying, grubbing, or breaking up land of all descriptions £50

CLASS II.—Stand 33; Article 296; J. FOWLER, Jun.

For steam cultivating apparatus, with 8-horse steam-engine worked at 10-horse power, suitable for ploughing land of all descriptions £50

For ditto ditto suitable for scarifying, grubbing, or breaking up land of all descriptions £25

Stand 92; Article 1048; J. and F. HOWARD.

For windlass, which may be attached to any ordinary portable steam-engine, and used for working steam ploughs or cultivators; and also for a set of ploughs and a cultivator which may be used on mixed and light soils having a level surface £25

Stand 68; Article 888, EDWARD HAYES.

For patent self-acting windlass, which may be attached to any ordinary portable steam-engine, and used for steam cultivation .. Silver Medal.

Stand 50; Article 639; ROBY and Co.

For 12-horse power portable double cylinder steam-engine, with Chandler and Oliver's patent drum ploughing windlass, suitable for steam cultivation Silver Medal.

END OF VOL. XXII.

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AND CHARING CROSS.

Royal Agricultural Society of England.

1861—1862.

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H.R.H. THE PRINCE CONSORT, K.G.

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H. HALL DARE, 12, *Hanover Square, London,* W.

Consulting-Chemist—Dr. Augustus Voelcker, *Royal Agricultural College, Cirencester.*
Veterinary-Inspector—James Beart Simonds, *Royal Veterinary College,* N.W.
Consulting Engineer—James Easton, or C. E. Amos, *Grove, Southwark,* S.E.
Seedsmen—Thomas Gibbs and Co., *Corner of Halfmoon Street, Piccadilly,* W.
Publisher—John Murray, 50, *Albemarle Street,* W.
Bankers—Messrs. Drummond, *Charing Cross,* S.W.

MEMORANDA.

Address of Letters.—The Society's office being situated in the postal district designated by the letter W, members, in their correspondence with the Secretary, are requested to subjoin that letter to the usual address.

General Meeting in London, in December, 1861.

General Meeting in London, May 22, 1862, at Twelve o'clock.

Meeting in Battersea Park, London, in 1862.

Monthly Council (for transaction of business), at 12 o'clock on the first Wednesday in every month, excepting January, September, and October: open only to Members of Council and Governors of the Society.

Weekly Council (for practical communications), at 12 o'clock on all Wednesdays in February, March, April, May, June, and July, excepting the first Wednesday in each of those months, and during adjournment: open to all Members of the Society, who are particularly invited by the Council to avail themselves of this privilege.

Adjournments.—The Council adjourn over Easter, Passion, and Whitsun weeks, when those weeks do not include the first Wednesday of the month; from the first Wednesday in August to the first Wednesday in November; and from the first Wednesday in December to the first Wednesday in February.

Diseases of Cattle, Sheep, and Pigs.—Members have the privilege of applying to the Veterinary Committee of the Society; and of sending animals to the Royal Veterinary College, on the same terms as if they were subscribers to the College.—(A statement of these privileges will be found in the present Appendix.)

Chemical Analysis.—The privileges of Chemical Analysis enjoyed by Members of the Society will be found stated in the Appendix of the present volume.

Local Cheques.—Members are particularly requested not to forward Country Cheques for payment in London, but London Cheques, or Post-office Orders on Vere-street (payable to H. Hall Dare), in lieu of them. All Cheques are required to bear upon them a penny draft or receipt stamp, which must be cancelled in each case by the initials of the drawer. They may also conveniently transmit their Subscriptions to the Society, by requesting their Country Bankers to pay (through their London Agents) the amount at the Society's Office (No. 12, Hanover Square, London), between the hours of ten and four, when official receipts, signed by the Secretary, will be given for such payments.

New Members.—Every candidate for admission into the Society must be proposed by a Member; the proposer to specify in writing the full name, usual place of residence, and post-town, of the candidate, either at a Council meeting, or by letter addressed to the Secretary.

Packets by Post.—Packets not exceeding two feet in length, width, or depth, consisting of written or printed matter (but not containing letters sealed or open), if sent without envelopes, or enclosed in envelopes open at each end, may be forwarded by the inland post, if stamped, at the following rates:—

For a packet not exceeding	4	ounces	(or quarter of a pound) . . .	1 penny.
„ „ „	8	„	(or half a pound)	2 pence.
„ „ „	16	„	(or one pound)	4 „
„ „ „	24	„	(or one pound and a half) . .	6 „
„ „ „	32	„	(or two pounds)	8 „

[And so on in the proportion of 8 ounces for each additional 2*d.*]

⁂ Members may obtain on application to the Secretary copies of an Abstract of the Charter and Bye-Laws, of a Statement of the General Objects, &c., of the Society, of Chemical and Veterinary Privileges, and of other printed papers connected with special departments of the Society's business.

Royal Agricultural Society of England.

GENERAL MEETING.

12, HANOVER SQUARE, WEDNESDAY, MAY 22, 1861.

REPORT OF THE COUNCIL.

THE Council have to report to the Members at their present General Meeting that during the past half-year 87 Members have been elected into the Society, 6 Governors and 67 Members have died, and the names of 236 Members have been on various accounts omitted from the list of the Society, which accordingly now comprises—

84 Life Governors,
90 Governors,
3,328 Members,
1,113 Life Members, and
18 Honorary Members,

making a total of 4,633 names on the list.

The Council have elected Lord Feversham to supply the vacancy in the class of Trustees, and Lord Walsingham in that of the Vice-Presidents, caused by the decease of His Grace the Duke of Sutherland, and the resignation of the Earl of Hardwicke.

Mr. William Sanday, of Holmepierrepont, has been elected a Member of the Council in the room of Lord Walsingham, and the Earl Cathcart in the room of Lord Feversham.

The statement of accounts for the half-year ending 31st December, 1860, has been examined and approved by the Society's auditors, and by Messrs. Quilter, Ball, and Co.

The funded capital has been lately raised to the amount of

14,219*l.* 2*s.* 9*d.* Stock in the New Three per Cents. by a further investment of 2000*l.*

The Finance Committee have been enabled to effect this by the large collection of arrears of subscription, which they have received authority from the Council to require all defaulters to pay. Repeated applications having been made for the arrears still outstanding, it has been decided to take proceedings in the County Courts against those who continue indebted to the Society.

It has been resolved that on the proposal of any person as a Member, a form shall be sent by the Secretary to the candidate for his signature, containing an acknowledgment of his future liability, which letter he must return before his election can be proceeded with.

A letter will also be sent to each Member in the course of the year, reminding him of his subscription being due.

The bye-laws and resolutions of Council having been collected and revised, a reprint of them has been made, and a copy will be forwarded to any Member on application to the Secretary.

The question of the free admission of Governors and Members to the Show-Yard during the Society's Country Meetings has been under the consideration of the Council.

Governors and Members who have paid their subscription for the current year, will be admitted free by tickets issued by the Secretary, which tickets will not be transferable; and any Governor or Member who shall be found to transfer or lend his ticket will be reported to the Council, and will in future forfeit the privileges of membership. Application for the Member's ticket is to be made in London, either by post or personally, not later than Friday, the 12th of July, and afterwards at the Secretary's office, near the entrance to the Show-Yard.

During the last month Professor Simonds has delivered a lecture on the nature and cause of the disease known as the Rot of Sheep; and Professor Voelcker, on the Manufacture of Cheese.

It has been determined to print Professor Simonds' lecture as a separate pamphlet.

The interest attaching to the Country Meeting will be this year largely increased by the competitive trials of steam-cultivators. The result of these trials will be made known at the Leeds Meeting.

The Society having offered this year a prize of 100*l.* for the best thoroughbred stallion, having served mares during the season 1861, which, in the opinion of the Judges, is best calculated to *improve and perpetuate* the breed of the sound and stout thoroughbred horse for general stud purposes, and an unusually large amount for horses in other classes, they contemplate that great interest will be evinced at this Meeting by the breeders of horses and the public generally throughout the kingdom.

The entries of implements and machinery in motion, to be exhibited at Leeds, closed on the 1st of May, and the Council have the satisfaction of stating that the applications for space in this department of the Show-Yard exceed those of any previous Meeting of the Society.

The entries for live stock and flax, which will close on the 1st of June, already give indications that this portion of the exhibition will be equally satisfactory.

The arrangements for the Leeds Meeting, to be held in the week commencing Monday 15th of July, are advancing rapidly. The Show-Yard will be open as under:—

	s.	*d.*
Monday, for implements, and for stock (after the judges have made their award)	5	0
Tuesday	2	6
Wednesday	2	6
Thursday	1	0
Friday	1	0

The successful competitors for the prizes offered by the Society have been, in Class IX., for 1859, Professor Tanner, of Queen's College, Birmingham, who gained the prize of 10*l.* for his Essay on the Breeding of Farm Stock; and in Class VIII., for 1860, Messrs. Raynbird, of Hackwood Park, Basingstoke, the prize of 10*l.* for their Paper on Adulteration of Seeds.

In Classes VIII., for 1859, and VI. and IX., for 1860, the Essays were not considered worthy of the prizes, and the Council cannot forbear from expressing their regret that there was not greater competition.

Her Majesty has been graciously pleased to grant a site of twenty-six acres in the Regent's Park for the purpose of holding an Exhibition of Stock and Implements in 1862. The Council have made the necessary arrangements with the Office of Works, and trust that the number of distinguished agriculturists, British and foreign, who will visit the International Exhibition will, by their presence in the Show-Yard, have an opportunity of witnessing the magnitude and success of our department of National Industry.

It has been resolved by the Council to maintain the original scheme of districts for the Country Meetings of the Society, viz.:—

A. Comprising the Counties of Cumberland, Durham, Northumberland, and Westmoreland
B. Lancashire and Yorkshire.
C. Cheshire, Shropshire, and Staffordshire.
D. Derbyshire, Leicestershire, Lincolnshire, Nottinghamshire, and Rutlandshire.
E. South Wales and Herefordshire, Monmouthshire, and Worcestershire.
F. Bedfordshire, Berkshire, Buckinghamshire, Gloucestershire, Northamptonshire, Oxfordshire, Warwickshire, and Wiltshire.
G. Cambridgeshire, Essex, Hertfordshire, Huntingdonshire, Norfolk, and Suffolk.
H. Cornwall, Devonshire, Dorsetshire, and Somersetshire.
I. Hampshire, Kent, Surrey, Sussex.
K. The Metropolis and its Postal District.

By Order of the Council,

H. Hall Dare, Secretary.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

Half-yearly Cash Account, from 1st July to 31st December, 1860.

Dr.

	£.	s.	d.	£	s.	d.	£.	s.	d.
To Balance in hand, 1st July, 1860:—									
Bankers				3,647	6	10			
Secretary				12	15	0			
							3,660	1	10
To Income, viz.:—									
Dividend on Stock				172	10	0			
Subscriptions:—									
Governors' Life-Composition ..	50	0	0						
Governors' Annual ..	35	0	0						
Members' Life-Compositions ..	139	0	0						
Members' Annual	2,112	1	0						
				2,336	1	0			
Journal:—									
Sales	141	11	2						
Advertisements	47	13	3						
				189	4	5			
Country Meeting —									
Canterbury				3,367	1	9			
							6,064	17	2
							£9,724	19	0

(Signed) A. N. HOOD, *Chairman of Finance Committee.*
T. W. BRAMSTON.
WILLIAM FISHER HOBBS.
QUILTER, BALL, JAY, & Co., *Accountants*

Cr.

	£.	s.	d.	£	s	d.	£.	s.	d.
By Expenditure —									
Official Salaries and Wages (3 quarters)	491	9	0						
Establishment — House Expenses, Rent, Taxes, Insurance .	336	15	3						
				828	4	3			
Postage and Carriage				26	12	8			
Journal.—									
Printing	471	17	0						
Editor's Salary (3 quarters) ..	375	0	0						
Prize Essays	120	0	0						
Other Contributors	72	3	0						
Delivery and Advertising	123	15	5						
				1,162	15	5			
Consulting Chemist's Salary				150	0	0			
Advertisements				3	12	6			
Testimonial to B. T. Brandreth Gibbs, Esq., Balance				25	4	0			
Sundries				10	2	4			
Subscriptions returned				3	0	0			
							2,209	11	2
By Country Meetings.—									
Paid on account—									
Canterbury Expenses				4,215	15	3			
Leeds				1	0	1			
							4,216	15	4
Prizes at Canterbury—									
Stock				1,627	0	0			
Implements				293	0	0			
							1,920	0	0
By Purchase of Dynamometer				.. .			100	0	0
By Balance in hand:—									
Bankers				1,236	19	2			
Secretary				41	13	4			
							1,278	12	6
							£9,724	19	0

Examined, audited, and found correct, this 17th day of May, 1861

(Signed) WILLIAM ASTBURY
HENRY CORBET.
WILLIAM COHEN.

Balance-Sheet, 31st December, 1860.

LIABILITIES.	£.	s.	d.	£.	s.	d.	£.	s.	d.
To Capital:—									
Surplus, 30th June, 1860				16,660	13	7			
Less Surplus of Expenditure over Income during the Half-year, viz.—									
Expenditure	4,314	10	10						
Income	2,697	15	5						
				1,616	15	5			
							15,043	18	2
To Canterbury Meeting:—									
Account outstanding				.. ..			32	11	0
							£15,076	9	2

ASSETS.	£.	s	d.	£.	s.	d.
By Cash in hand	..	.		1,278	12	6
By New 3 per cent. Stock 12,000*l*., cost	..	..		11,796	14	7
By Books and Furniture, Society's House, Hanover Square	..	.		2,000	0	0
By Leeds Meeting	..	.		1	2	1
				£15,076	9	2

Mem.—The above Assets are exclusive of the amount recoverable in respect of Subscriptions in arrear 31st December, 1860, which at that date amounted to 1,261*l*.

SHOW AT LEEDS: JULY, 1861.

STEWARDS OF THE YARD.

Stewards of Cattle.

Mr. Fisher Hobbs.
Mr. Pain.
Hon. W. G. Cavendish.

Stewards of Implements.

Mr. H. B. Caldwell.
Hon. A. Vernon.
Lord Leigh.

Steward of Flax, Wool, Cheese, and Butter.

Henry Ludolf.

Honorary Director of the Show.

B. T. Brandreth Gibbs.

JUDGES.

Short-horns.

John Thompson,
A. L. Maynard,
William Ladds.

Herefords.

T. Duckham,
E. L. Franklin,
S. Bloxsidge.

Devons, Sussex, other Breeds, and Dairy Cows.

John Coleman,
Robert Smith,
Henry Trethewy.

Thorough-bred Stud Horses.

Hon. Colonel Cotton,
James Weatherby,
Captain White,
Lord Tredegar.

Light Horses.

C. Nainby,
H. Thurnall,
R. S. Waters.

Agricultural and Dray Horses.

John Atkinson,
J. H. Wood,
W. C. Spooner.

Leicesters.

N. C. Stone,
Luke Borman,
T. Twitchell.

Southdowns.

Peter Purves,
H. Overman,
H. Fookes.

Shropshires.

C. Randell,
G. Cureton,
E. Gough.

Long-wools.

Hugh Aylmer,
W. Bartholomew,
Henry Bateman.

Short-wools.

J. Rawlence, J. S. Homer,
Edward Little.

Pigs.

J. S. Turner, E. P. Squarey,
William Cattle.

Implements.

Steam Cultivators.

William Owen,
Owen Wallis, C.E.,
Clare Sewell Read.

Drills, Manure Distributors, and Horse Hoes.

Joseph Druce, John Thompson,
Thomas Huskinson.

Mowing, Reaping, and Haymaking Machines, and Horse Rakes.

John Hicken, G. M. Hipwell,
Wm. Tindall.

Carts, Waggons, and Miscellaneous Articles.

John Hannam,
George Kenrick.

Cheese and Butter.

Henry Ellis,
Robert Cookson.

Wool.

Thomas Clayton,
James Thompson.

Flax.

Richard Townsley,
Professor John Wilson.

Veterinary-Inspectors.

Professor Simonds,
Professor Spooner.

Consulting-Engineer.

Charles Edwards Amos,
(Firm of Easton and Amos).

AWARD OF PRIZES.

Cattle: *Short-Horns.*

CLASS I.

Lord Feversham, of Duncombe Park, Helmsley, Yorkshire: the Prize of Thirty Sovereigns, for his 4 years 8 months and 5 days-old Bull; bred by exhibitor.

James Haughton Langston, M.P., of Sarsden House, Chipping-Norton, Oxfordshire: the Prize of Fifteen Sovereigns, for his 3 years 2 months 3 weeks and 1 day-old Bull; bred by H. Ambler, of Watkinson Hall, Halifax

James Dickinson, of Balcony Farm-house, Upholland, Wigan, Lancashire: the Prize of Five Sovereigns, for his 2 years 6 months and 3 weeks-old Bull; bred by exhibitor.

Highly Commended.

James Banks Stanhope, M.P , of Revesby Abbey, Boston, Lincolnshire · for his 2 years 4 months and 3 days-old Bull; bred by exhibitor.

Jonas Webb, of Babraham, near Cambridge: for his 5 years and 2 months-old Bull , bred by exhibitor

James Haughton Langston, M P.: for his 2 years 7 months weeks and 1 day-old Bull; bred by Mr. Housman, of Lime Bank, Lancaster.

William Hall, of Butterwick, Ganton, Yorkshire: for his 2 years 10 months 3 weeks and 5 days-old Bull , bred by exhibitor.

Commended.

Sir C. R. Tempest, Bart, of Broughton Hall, Skipton, Yorkshire · for his 2 years 5 months and 1 day-old Bull; bred by exhibitor

Lord Kinnaird, K T., of Rossie Priory, Inchture, Perthshire for his 3 years 5 months and 6 days-old Bull; bred by exhibitor.

Jonathan Peel, of Knowlmere Manor, Clitheroe, Yorkshire: for his 2 years 4 months 1 week and 1 day-old Bull; bred by exhibitor.

John Lynn, of Church Farm, Stroxton, Grantham, Lincolnshire: for his 3 years 11 months and 2 weeks-old Bull; bred by the late Robert Lynn, of Church Farm, Stroxton, Grantham, Lincolnshire.

Henry Ambler, of Watkinson Hall, Halifax, Yorkshire: for his 2 years 6 months and 4 weeks-old Bull; bred by exhibitor.

Edward Holland, M.P., of Dumbleton Hall, Evesham, Worcestershire. for his 2 years 6 months 2 weeks and 1 day-old Bull; bred by exhibitor.

CLASS II.

John Taylor, of Moreton Hall, Whalley, Lancashire: the Prize of Twenty-five Sovereigns, for his 1 year 4 months 2 weeks and 3 days-old Bull; bred by exhibitor.

Jonas Webb: the Prize of Fifteen Sovereigns, for his 1 year 9 months 3 weeks and 3 days-old Bull; bred by exhibitor.

Sir Walter Calverley Trevelyan, Bart., of Wallington, Newcastle-upon-Tyne, Northumberland: the Prize of Five Sovereigns, for his 1 year 5 months 2 weeks and 3 days-old Bull; bred by Henry Ambler, of Watkinson Hall, near Halifax, Yorkshire.

HIGHLY COMMENDED.

SIR CHARLES R. TEMPEST, Bart.: for his 1 year 6 months and 19 days-old Bull; bred by exhibitor.

WILLIAM WRIGHT, of Sigglesthorne Hall, near Hull: for his 1 year 8 months 1 week and 5 days-old Bull; bred by William Carr, of Stackhouse, Settle, Yorkshire.

JONATHAN PEEL: for his 1 year and 3 days-old Bull; bred by exhibitor.

THOMAS BARNES, of Westland Moynalty, co. Meath, Ireland: for his 1 year 4 months 1 week and 1 day-old Bull, bred by exhibitor.

FRANCIS HAWKSWORTH FAWKES, of Farnley Hall, Otley, Yorkshire: for his 1 year 3 months 2 weeks and 1 day-old Bull; bred by exhibitor.

THE DUKE OF MONTROSE, of Buchanan, Glasgow: for his 1 year 11 months and 1 week-old Bull; bred by exhibitor.

CLASS III.

CHARLES HOWARD, of Biddenham, Bedford: the Prize of TEN SOVEREIGNS, for his 9 months 1 week and 4 days-old Bull-calf; bred by exhibitor

HENRY AMBLER: the Prize of FIVE SOVEREIGNS, for his 8 months and 2 days-old Bull-calf, bred by William Carr, of Stackhouse, Settle, Yorkshire.

HIGHLY COMMENDED.

WILLIAM CARR, of Stackhouse, Settle, Yorkshire for his 10 months 1 week and 6 days-old Bull-calf; bred by exhibitor.

EDWARD BOWLY, of Siddington House, Cirencester, Gloucester: for his 7 months 2 weeks and 1 day-old Bull-calf; bred by exhibitor.

COMMENDED.

JONATHAN PEEL for his 9 months 2 weeks and 1 day-old Bull-calf; bred by exhibitor.

SIR ANTHONY DE ROTHSCHILD, Bart., of Aston Clinton, Tring, Bucks for his 10 months 1 week and 5 days-old Bull-calf, bred by exhibitor

LORD FEVERSHAM for his 10 months 2 weeks and 1 day-old Bull-calf; bred by exhibitor.

CLASS IV.

CAPTAIN GUNTER, of The Grange, Wetherby, Yorkshire: the Prize of TWENTY SOVEREIGNS, for his 3 years 7 months and 6 days-old Cow, In-calf: bred by exhibitor.

RICHARD BOOTH, of Warlaby, Northallerton, Yorkshire: the Prize of TEN SOVEREIGNS, for his 5 years 8 months 3 weeks and 3 days-old Cow, In-milk and In-calf; bred by exhibitor.

LADY PIGOT, of Branches Park, Newmarket, Suffolk: the Prize of FIVE SOVEREIGNS, for her 4 years 6 months 3 weeks and 5 days-old Cow, In-calf; bred by Mr. Jonas Webb, of Babraham, Cambridge.

HIGHLY COMMENDED.

HENRY AMBLER for his 3 years 1 month 1 week and 5 days-old Cow, In-calf, bred by exhibitor.

RICHARD BOOTH: for his 3 years 9 months 2 weeks and 1 day-old Cow, In-milk and In-calf; bred by exhibitor.

COMMENDED.

HENRY AMBLER: for his 3 years 10 months 3 weeks and 5 days-old Cow, In-milk and In-calf; bred by exhibitor.

THE HON. COLONEL DOUGLAS PENNANT, M.P., of Penrhyn Castle, Bangor, Carnarvon: for his 3 years 3 months and 1 day-old Cow, In-milk and In-calf; bred by Mr. Bell, of Bickerstaffe.

LADY PIGOT. for his 3 years 9 months 3 weeks and 5 days-old Cow, In-milk and In-calf; bred by Mr. Jolly, of Warlaby, Northallerton, Yorkshire.

CLASS V.

Captain Gunter: the Prize of Fifteen Sovereigns, for his 2 years 11 months 1 week and 4 days-old Heifer, In-milk and In-calf: bred by exhibitor.

Richard Booth: the Prize of Ten Sovereigns, for his 2 years 5 months and 3 weeks-old Heifer, In-calf; bred by exhibitor.

Joseph Robinson, of Clifton Pastures, Newport Pagnell, Buckingham · the Prize of Five Sovereigns, for his 2 years 1 month and 3 weeks-old Heifer, In-calf; bred by exhibitor.

Highly Commended.

Captain Gunter: for his 2 years 11 months 1 week and 5 days-old Heifer, In-milk and In-calf; bred by exhibitor.

Commended.

Sir Charles R. Tempest, Bart.: for his 2 years 10 months and 5 days-old Heifer, In-milk and In-calf; bred by exhibitor.

Hon and Rev Thomas Henry Noel Hill, of Berrington, Shrewsbury, Salop . for his 2 years 7 months and 3 weeks-old Heifer, In-calf; bred by exhibitor.

Jeffrey Bulmer, of Darlington and Aislaby Grange Farm, Darlington, Durham: for his 2 years 3 months and 3 days-old Heifer, In-calf, bred by exhibitor.

Richard Stratton, of Stapleton, Bristol: for his 2 years 1 month and 6 days-old Heifer, In-calf; bred by exhibitor.

Richard Stratton: for his 2 years 1 month 2 weeks and 1 day-old Heifer, In-calf; bred by exhibitor.

CLASS VI.

Captain Gunter: the Prize of Fifteen Sovereigns, for his 1 year 5 months 6 days-old Yearling Heifer; bred by exhibitor.

The Hon. George Edwin Lascelles, of Moor Hill, Harewood, Leeds: the Prize of Ten Sovereigns, for his 1 year 8 months and 2 weeks-old Yearling Heifer; bred by exhibitor.

Jonathan Peel: the Prize of Five Sovereigns, for his 1 year 1 month 3 weeks and 5 days-old Yearling Heifer; bred by exhibitor.

Highly Commended.

Jonathan Peel: for his 1 year 9 months and 1 day-old Yearling Heifer; bred by exhibitor.

Commended.

Stewart Marjoribanks, of Bushey Grove, Watford, Herts: for his 1 year 9 months 3 weeks and 4 days-old Yearling Heifer; bred by exhibitor.

Captain Gunter · for his 1 year 7 months 3 weeks and 3 days-old Yearling Heifer; bred by exhibitor.

Francis Wythes: of Ravensden House, Bedford: for his 1 year 1 month 1 week and 3 days-old Yearling Heifer; bred by exhibitor.

Edward Holland, M.P., of Dumbleton Hall, Evesham, Worcestershire: for his 1 year 3 weeks and 4 days-old Yearling Heifer, bred by exhibitor.

Lady Pigot: for his 1 year 10 months 3 weeks and 7 days-old Yearling Heifer; bred by Mr Ellison, of Lough Glynie, French Park, Ireland

Edmund Ruck, of Castle Hill, Cricklade, Wilts: for his 1 year 4 months 1 week 1 day-old Yearling Heifer; bred by exhibitor.

CLASS VII.

Stewart Marjoribanks: the Prize of Ten Sovereigns, for his 11 months 4 weeks and 1 day-old Heifer Calf; bred by exhibitor.

Thomas Atherton, of Chapel House, Speke, Garston, Liverpool: the Prize of Five Sovereigns, for his 10 months 2 weeks and 1 day-old Heifer Calf; bred by exhibitor.

HIGHLY COMMENDED.

WILLIAM CARR: for his 11 months-old Heifer Calf; bred by exhibitor.

ROBERT TENNANT, of Scarcroft Lodge, Leeds: for his 11 months and 4 days-old Heifer Calf; bred by exhibitor.

THE HON. AND REV. THOMAS HENRY NOEL HILL, of Berrington, Shrewsbury, Salop: for his 10 months 3 weeks and 3 days-old Heifer Calf; bred by exhibitor.

JOSEPH ROBINSON, of Clifton Pastures, Newport Pagnell: for his 8 months and 4 days-old Heifer Calf; bred by exhibitor.

COMMENDED.

STEWART MARJORIBANKS· for his 11 months 3 weeks and 5 days-old Heifer Calf; bred by exhibitor.

JONATHAN PEEL for his 10 months and 2 weeks-old Heifer Calf, bred by exhibitor.

CHARLES HOWARD. for his 10 months 2 weeks and 1 day-old Heifer Calf, bred by exhibitor.

CATTLE: *Herefords.*

CLASS I.

THOMAS REA, of Westonbury, Pembridge, Hereford: the Prize of THIRTY SOVEREIGNS, for his 2 years 8 months-old Bull, bred by exhibitor.

THOMAS REA: the Prize of FIFTEEN SOVEREIGNS, for his 3 years 8 months and 2 weeks-old Bull, bred by exhibitor.

GEORGE BRAY, of Haven Dilwyn, Leominster, Hereford: the Prize of FIVE SOVEREIGNS, for his 5 years and nearly 4 months-old Bull; bred by exhibitor.

HIGHLY COMMENDED.

WILLIAM PERRY, of St. Oswald, Cholstrey, Leominster, Hereford: for his 2 years 9 months and 1 day-old Bull; bred by exhibitor.

COMMENDED.

WILLIAM COOKE MORRIS, of Whitwick, Ledbury, Hereford for his 4 years 10 months 1 week and 6 days-old Bull; bred by Mr. Williams, of Kingsland, Leominster, Hereford.

CLASS II.

RICHARD HILL, of Golding Hall, Shrewsbury, Salop: the Prize of TWENTY-FIVE SOVEREIGNS, for his 1 year 10 months and 1 week-old Bull; bred by exhibitor.

EDMUND WRIGHT, of Halston Hall, Oswestry, Shropshire: the Prize of FIFTEEN SOVEREIGNS, for his 1 year 11 months and 4 days-old Bull; bred by exhibitor.

WILLIAM PERRY, of St. Oswald, Cholstrey, Leominster, Hereford: the Prize of FIVE SOVEREIGNS, for his 1 year 11 months and 4 days-old Bull; bred by exhibitor.

COMMENDED.

JOHN NAYLOR, of Leighton Hall, Welshpool. Montgomery: for his 1 year 11 months and 4 days-old Bull; bred by exhibitor.

CLASS III.

RICHARD HILL: the Prize of TEN SOVEREIGNS, for his 10 months and 3 weeks-old Bull Calf; bred by exhibitor.

JOHN WILLIAMS, of St. Mary's Kingsland, Leominster, Hereford: the Prize of FIVE SOVEREIGNS, for his 10 months 2 weeks and 5 days-old Bull Calf: bred by exhibitor.

COMMENDED.

HIS ROYAL HIGHNESS THE PRINCE CONSORT: for his 10 months 2 weeks and 1 day-old Bull Calf; bred by exhibitor.

CLASS IV.

JOHN NAYLOR, of Leighton Hall, Welshpool, Montgomery: the Prize of TWENTY SOVEREIGNS, for his 4 years and 11 months-old Cow, In-milk and In-calf; bred by exhibitor.

PHILIP TURNER, of Leen, Pembridge, Leominster, Hereford: the Prize of TEN SOVEREIGNS, for his 3 years and 11 months-old Cow, In-milk; bred by exhibitor.

ROBERT LEYSHON, of Island Farm, Bridgend, Glamorgan: the Prize of FIVE SOVEREIGNS, for his 5 years and 9 months-old Cow, In-milk: bred by exhibitor.

HIGHLY COMMENDED.

EXECUTORS of the late LORD BERWICK, of Cronkhill, Shrewsbury, Salop: for his 3 years 9 months and 2 weeks-old Cow, In-milk and In-calf, bred by the late Lord Berwick.

COMMENDED.

JOHN WILLIAMS, of St. Mary's Kingsland, Leominster, Hereford · for his 4 years 8 months 2 weeks and 2 days-old Cow, In-calf, bred by exhibitor.

EXECUTORS of the late LORD BERWICK for his 5 years 11 months and 6 days-old Cow, In-calf; bred by the late Lord Berwick.

CLASS V.

PHILIP TURNER: the Prize of FIFTEEN SOVEREIGNS, for his 2 years 6 months and 1 week-old Heifer, In-calf; bred by exhibitor.

JOHN NAYLOR: the Prize of TEN SOVEREIGNS, for his 2 years and 11 months-old Heifer, In-calf; bred by exhibitor.

ROBERT LEYSHON: the Prize of FIVE SOVEREIGNS, for his 2 years and 10 months-old Heifer, In-calf, bred by exhibitor.

CLASS VI.

WILLIAM PERRY: the Prize of FIFTEEN SOVEREIGNS, for his 1 year 11 months and 20 days-old Yearling Heifer, bred by exhibitor.

JOHN NAYLOR: the Prize of TEN SOVEREIGNS, for his 1 year 11 months and 2 weeks-old Yearling Heifer, bred by exhibitor.

JAMES MARSH READ, of Elkstone, Cirencester, Gloucester: the Prize of FIVE SOVEREIGNS, for his 1 year 9 months and 2 weeks-old Yearling Heifer; bred by exhibitor.

COMMENDED.

HIS ROYAL HIGHNESS THE PRINCE CONSORT. for his 1 year 11 months and 3 days-old Yearling Heifer; bred by exhibitor.

CLASS VII.

EXECUTORS of the late LORD BERWICK: the Prize of TEN SOVEREIGNS, for his 6 months and 19 days-old Heifer Calf; bred by the late Lord Berwick.

JOHN WILLIAMS: the Prize of FIVE SOVEREIGNS, for his 10 months 1 week and 4 days-old Heifer Calf; bred by exhibitor.

COMMENDED.

PHILIP TURNER: for his 10 months 3 weeks and 4 days-old Heifer Calf; bred by exhibitor.

CATTLE: *Devons.*

CLASS I.

JOHN BODLEY, of Stockley Pomeroy, Crediton, Devon: the Prize of THIRTY SOVEREIGNS, for his 3 years and 1 month-old Bull; bred by exhibitor.

GEORGE TURNER, of Barton, Exeter, Devon: the Prize of FIFTEEN SOVEREIGNS, for his 3 years and 9 months-old Bull; bred by exhibitor.

HIS ROYAL HIGHNESS THE PRINCE CONSORT: the Prize of FIVE SOVEREIGNS, for his 3 years 9 months 1 week and 4 days-old Bull; bred by His Royal Highness.

COMMENDED.

JOHN COURTENAY HALSE, of Pulworthy Farm, Molland, South Molton, Devonshire: for his 3 years and 5 months-old Bull; bred by exhibitor.

CLASS II.

WALTER FARTHING, of Stowey Court, Bridgwater, Somerset: the Prize of TWENTY-FIVE SOVEREIGNS, for his 1 year 7 months and 2 weeks-old Bull; bred by exhibitor.

JAMES MERSON, of Brinsworthy, North Molton, Devon: the Prize of FIFTEEN SOVEREIGNS, for his 1 year 5 months and 3 days-old Bull; bred by exhibitor.

GEORGE TURNER: the Prize of FIVE SOVEREIGNS, for his 1 year and 9 months-old Bull; bred by exhibitor.

COMMENDED.

JOHN COURTENAY HALSE. for his 1 year and 6 months-old Bull, bred by exhibitor.

CLASS III.

WALTER FARTHING: the Prize of TEN SOVEREIGNS, for his 6 months and 2 days-old Bull Calf; bred by exhibitor.

HIS ROYAL HIGHNESS THE PRINCE CONSORT: the Prize of FIVE SOVEREIGNS, for his 7 months 2 weeks and 4 days-old Bull-Calf; bred by exhibitor.

HIGHLY COMMENDED.

WILLIAM HOLE, of Hannaford, Barnstaple, Devon: for his 8 months 1 week and 1 day-old bull Calf; bred by exhibitor.

Class generally Commended.

CLASS IV.

HIS ROYAL HIGHNESS THE PRINCE CONSORT: the Prize of TWENTY SOVEREIGNS, for his 5 years 1 month 2 weeks and 3 days-old Cow, In-milk; bred by exhibitor.

GEORGE TURNER: the Prize of TEN SOVEREIGNS, for his 6 years 5 months and 2 weeks-old Cow, In-milk and In-calf; bred by exhibitor.

CLASS V.

EDWARD POPE, of Great Toller, Maiden Newton, Dorset: the Prize of FIFTEEN SOVEREIGNS, for his 2 years 7 months and 2 weeks-old Heifer, In-calf; bred by exhibitor.

JAMES HOLE, of Knowle House, Dunster, Somerset: the Prize of TEN SOVEREIGNS, for his 2 years and 7 months-old Heifer, In-calf; bred by exhibitor.

EDWARD POPE, of Great Toller, Maiden Newton, Dorset: the Prize of FIVE SOVEREIGNS, for his 2 years 7 months and 1 week-old Heifer, In-calf; bred by exhibitor.

CLASS VI.

Walter Farthing: the Prize of Fifteen Sovereigns, for his 1 year 6 months and 3 weeks-old Yearling Heifer; bred by exhibitor.

James Merson, of Brinsworthy, North Molton, Devon: the Prize of Ten Sovereigns, for his 1 year 11 months 1 week and 4 days-old Yearling Heifer; bred by exhibitor.

James Merson: the Prize of Five Sovereigns, for his 1 year 10 months 1 week and 1 day-old Yearling Heifer; bred by exhibitor.

Highly Commended.

George Turner: for his 1 year 8 months and 2 weeks-old Yearling Heifer; bred by exhibitor.

James Hole: for his 1 year and 8 months-old Yearling Heifer; bred by exhibitor

Class generally Commended.

CLASS VII.

James Davey, of Flitton Barton, South Molton, Devon: the Prize of Ten Sovereigns, for his 6 months and 2 weeks-old Heifer Calf; bred by exhibitor.

George Turner: the Prize of Five Sovereigns, for his 9 months and 3 weeks-old Heifer Calf; bred by exhibitor.

Commended.

William Hole: for his 8 months 1 week and 2 days-old Heifer Calf; bred by exhibitor.

Cattle: *Sussex.*

CLASS II.

John and Alfred Heasman, of Angmering, Arundel, Sussex: the Prize of Ten Sovereigns, for their 1 year 3 months and 1 week old Bull; bred by exhibitors.

CLASS IV.

John and Alfred Heasman: the Prize of Ten Sovereigns, for their 2 years 6 months and 3 weeks-old Heifer, In-calf; bred by exhibitors.

Cattle: *Other established Breeds.*

CLASS I.

Alexander Bowie, of Mains of Kelly, Arbroath, Forfarshire: the Prize of Ten Sovereigns, for his 3 years 11 months 2 weeks and 1 day-old Bu''; bred by William M'Combie, of Tillyfour, Aberdeen.

Commended.

Samuel Camfield Baker, of Beaufort-street, King's Road, Chelsea, Middlesex: for his 3 years and 2 months-old Bull; bred by exhibitor.

CLASS IV.

Lord Sondes, of Elmham Hall, Thetford, Norfolk: the Prize of Ten Sovereigns, for his 2 years and 3 months-old Heifer, In-calf; bred by exhibitor.

COMMENDED.

SAMUEL CAMFIELD BAKER: for his under 3 years-old Heifer, In-calf; breeder unknown.

SAMUEL CAMFIELD BAKER: for his under 3 years-old Heifer, In-calf; breeder unknown.

SAMUEL CAMFIELD BAKER: for his under 3 years-old Heifer, In-calf; breeder unknown.

LORD SONDES: for his 2 years and 6 months-old Heifer, In-calf; bred by exhibitor.

CLASS V.

LORD SONDES: the Prize of FIVE SOVEREIGNS, for his 1 year and 4 months-old Yearling Heifer; bred by exhibitor.

HORSES: *Thorough-Bred.*

JOHN WYATT, of Nutbourne, Emsworth, Hants: the Prize of ONE HUNDRED SOVEREIGNS, for his 4 years-old Stud Horse; bred by exhibitor.

TOM HUSSEY, of Stud Farm, Skirmett, Henley-on-Thames, Oxfordshire: the Prize of TWENTY-FIVE SOVEREIGNS, for his 12 years-old Stud Horse; bred by exhibitor.

HIGHLY COMMENDED.

THOMAS GROVES, of Park House, Spofforth, Wetherby, Yorkshire: for his 11 years-old Stud Horse; bred by B. Plummer, of Yorkshire.

JOHN JOHNSTONE, of Broadholme, Lockerby, Dumfriesshire: for his 8 years-old Stud Horse; bred by the Earl of Derby, of Knowsley Hall, Prescot, Lancashire.

COMMENDED.

THOMAS HUMPHREY PEDLEY, of Stubbing Court, Chesterfield, Derbyshire: for his 7 years-old Stud Horse; bred by Mr. Charles Greville, of London.

HORSES: *Clevelands.*

CLASS I.

HENRY RICKATSON, of the Angel Hotel, Wetherby, Yorkshire: the Prize of TWENTY SOVEREIGNS, for his 11 years-old Stallion.

CLASS II.

JOHN SMITH, of Long Newton, Darlington; the Prize of TEN SOVEREIGNS, for his 6 years-old Mare; bred by exhibitor.

HIGHLY COMMENDED.

GEORGE HOLMES, of Toll Gavel, Beverley, Yorkshire: for his 9 years-old Mare; bred by Mrs. Maughan, of Normanby, Middlesbro'.

OTHER HORSES.

CLASS I.

JOSEPH WEBSTER, of Allerston, Pickering, York: the Prize of TWENTY-FIVE SOVEREIGNS, for his 10 years-old Stallion; bred by Mr. Harves.

James and Charles Moffat, of Kirklington Park, Kirklington, Cumberland: the Prize of Fifteen Sovereigns, for their 4 years and 1 day-old Stallion; bred by Sir Wilfrid Lawson, Bart, of Brayton Hall, Aspatria, Cumberland.

Thomas Groves: the Prize of Five Sovereigns, for his 6 years-old Stallion; bred by James Davidson.

CLASS II.

William Bousfield, of Gardener's Arms, Pilling, Fleetwood-on-Wire, Lancashire: the Prize of Fifteen Sovereigns, for his 16 years-old Brood Mare, In-foal.

Alfred Hawxwell, of Prospect House, Thirsk, Yorkshire: the Prize of Ten Sovereigns, for his 6 years-old Brood Mare; breeder unknown.

CLASS III.

Job Aspinall, of Mount Tabor, Halifax, Yorkshire: the Prize of Fifteen Sovereigns, for his 20 years-old Brood Mare and Foal; breeder not known.

Richard Cook, of Huggate, Pocklington, Yorkshire: the Prize of Ten Sovereigns, for his 7 years-old Brood Mare, In-foal; bred by exhibitor.

William Bradley Wainman, of Carhead, Cross Hill, Yorkshire: the Prize of Five Sovereigns, for his 14 years-old Brood Mare; breeder unknown.

Horses: *Agricultural.*

CLASS I.

Jonas Webb, of Babraham, Cambridge: the Prize of Twenty-five Sovereigns, for his 6 years 1 month and 1 day-old Stallion; bred by exhibitor.

Thomas Crisp, of Butley Abbey, Wickham Market, Suffolk: the Prize of Fifteen Sovereigns, for his 11 years-old Stallion; bred by Charles Cordy, Trimley, Ipswich, Suffolk.

Benjamin Taylor, of Peterborough, Northampton: the Prize of Five Sovereigns, for his 10 years-old Stallion; bred by John Woolsey, of Newton, Wisbeach, Cambridge.

Highly Commended.

Matthew Reed, of Beamish Burn, Chester-le-Street, Durham: for his 5 years-old Stallion; bred by William Pank, of Borough Fen, Northampton.

Commended.

Herman Biddell, of Playford, Ipswich, Suffolk: for his 4 years and 2 months-old Stallion; bred by Thomas Read, of Rendlesham, Wickham Market, Suffolk.

John Snowdon, of Stonesby, Waltham, Leicester: for his 6 years-old Stallion; bred by exhibitor.

CLASS II.

Edwin Butler, of Balderton, Newark, Notts: the Prize of Twenty Sovereigns, for his 2 years 1 month and 3 weeks-old Stallion; bred by Andrew Guy, of Eaton Waltham, Leicestershire.

Thomas Mills, of Harmston, Lincoln: the Prize of Ten Sovereigns, for his 2 years 1 month 2 weeks and 6 days-old Stallion; bred by exhibitor.

Edward Holland, of Dumbleton Hall, Evesham, Worcestershire: the Prize of Five Sovereigns, for his 2 years and 3 months-old Stallion; bred by exhibitor.

HIGHLY COMMENDED.

WILLIAM WILSON, of Baylham Hall, Ipswich, Suffolk; for his 2 years and 2 months-old Stallion; bred by Samuel Wrinch, of Holland, Colchester, Essex.

COMMENDED.

RICHARD BELCHER, of Stanford, Farringdon: for his 2 years and 2 months-old Stallion; bred by exhibitor.

JOHN HEMMANT, of Thorney, Cambridgeshire: for his 2 years-old Stallion; bred by exhibitor.

CLASS III.

EDWARD SUMPTER, of Billinghay Dales, Billinghay, Lincoln: the Prize of TWENTY SOVEREIGNS, for his 10 years-old Mare; bred by exhibitor.

WILLIAM PROUDE, of Kirk Hammerton, Green Hammerton, York: the Prize of TEN SOVEREIGNS, for his 5 years-old Mare; bred by Mr. Gofton, Pocthorp, Driffield, York.

HIS ROYAL HIGHNESS THE PRINCE CONSORT: the Prize of FIVE SOVEREIGNS, for his 7 years-old Mare; bred by exhibitor.

HIGHLY COMMENDED.

JOHN GAY ATTWATER, of Hallingwood Farm, Cubberley, Cheltenham, Gloucestershire. for his 6 years-old Mare, bred by exhibitor.

COMMENDED.

EVAN CHARLES SUTHERLAND WALKER, of Crow Nest, near Halifax, Yorkshire: for his about 9 years-old Mare.

CLASS IV.

HIS ROYAL HIGHNESS THE PRINCE CONSORT: the Prize of FIFTEEN SOVEREIGNS, for his 2 years 1 month 2 weeks and 1 day-old Filly; bred by exhibitor.

JOHN WARD, of East Mersea, Colchester, Essex: the Prize of TEN SOVEREIGNS, for his 2 years and 3 months-old Filly.

THE HON. COLONEL DOUGLAS PENNANT, M.P., of Penrhyn Castle, Bangor, Carnarvon: the Prize of FIVE SOVEREIGNS, for his 2 years-old Filly; bred by exhibitor.

HIGHLY COMMENDED.

SAMUEL WOLTON, of Newbourn Hall, Woodbridge, Suffolk: for his 2 years-old Filly; bred by exhibitor.

COMMENDED.

JOHN CLAYDEN, of Littlebury, Saffron-Walden, Essex: for his 2 years-old Filly; bred by Samuel Clayden, of Linton, Cambridgeshire.

DRAY-HORSES.

CLASS I.

ROBERT GIBSON, of Newcastle-upon-Tyne: the Prize of TWENTY-FIVE SOVEREIGNS, for his 10 years-old Stallion; bred by William Beatie, of Easton, Cumberland.

WILLIAM KING, of Witleigh Inn, Tiverton, Devon: the Prize of TEN SOVEREIGNS, for his 9 years and 1 month-old Stallion; bred by J. Hutson, of East Brent, near Bristol.

JAMES ASHCROFT, of Cow-lane, Wavertree, near Liverpool: the Prize of FIVE SOVEREIGNS, for his 3 years 1 month 2 weeks and 2 days-old Stallion; bred by exhibitor.

COMMENDED.

JOHN MANNING, of Orlingbury, near Wellingborough, Northampton: for his 8 years-old Stallion; bred by Henry Ogden.

CLASS III.

THOMAS FULLARD, of Thorney, near Peterborough: the Prize of TWENTY SOVEREIGNS, for his 8 years-old Mare; bred by exhibitor.
JOSEPH ROBERTS, of Marlborough, Egremont, Cumberland: the Prize of TEN SOVEREIGNS, for his 8 years-old Mare; bred by George Adams, of Warrowdales, Alstenfield, near Ashbourne, Derbyshire.

CLASS IV.

JOHN KAY FARNWORTH, of Alderley Edge, Chorley, Cheshire: the Prize of FIFTEEN SOVEREIGNS, for his 2 years-old Filly; breeder not known.
JOHN GAY ATTWATER, of Hallingwood Farm, Cubberley, Cheltenham: the Prize of TEN SOVEREIGNS, for his 2 years-old Filly; bred by exhibitor.

SHEEP: *Leicesters.*

CLASS I.

LIEUTENANT-COLONEL INGE, of Thorpe Constantine, Tamworth, Staffordshire: the Prize of TWENTY SOVEREIGNS, for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.
WILLIAM SANDAY, of Holme Pierrepont, Notts: the Prize of TEN SOVEREIGNS, for his 1 year 4 or 5 months-old Shearling Ram; bred by exhibitor.
WILLIAM SANDAY: the Prize of FIVE SOVEREIGNS, for his 1 year 4 or 5 months-old Shearling Ram; bred by exhibitor.

HIGHLY COMMENDED.

LIEUTENANT-COLONEL INGE: for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.

COMMENDED.

THOMAS EDWARD PAWLETT, of Beeston, Sandy, Bedfordshire: for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.

CLASS II.

WILLIAM SANDAY: the Prize of TWENTY SOVEREIGNS, for his 3 years 4 or 5 months-old Ram; bred by exhibitor.
WILLIAM SANDAY: the Prize of TEN SOVEREIGNS, for his 2 years and 4 or 5 months-old Ram; bred by exhibitor.
WILLIAM SANDAY: the Prize of FIVE SOVEREIGNS, for his 3 years and 4 or 5 months-old Ram; bred by exhibitor.

HIGHLY COMMENDED.

JOHN BORTON, of Barton House, Malton, Yorkshire: for his 3 years and 3 months-old Ram; bred by exhibitor.

COMMENDED.

JOHN BORTON: for his 2 years and 3 months-old Ram; bred by exhibitor.
JOHN BORTON: for his 4 years and 3 months-old Ram; bred by exhibitor.

Class generally Commended.

CLASS III.

William Sanday: the Prize of Twenty Sovereigns, for his 1 year and 4 or 5 months-old Shearling Ewes; bred by exhibitor.

Lieutenant-Colonel Inge: the Prize of Ten Sovereigns, for his 1 year and 4 months-old Shearling Ewes; bred by exhibitor.

George Turner, of Barton, Exeter, Devon: the Prize of Five Sovereigns, for his 1 year 3 months and 2 weeks-old Shearling Ewes; bred by exhibitor.

Sheep: *Southdowns.*

CLASS I.

William Rigden, of Hove, Brighton, Sussex: the Prize of Twenty Sovereigns, for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.

William Rigden: the Prize of Ten Sovereigns, for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.

John and Alfred Heasman, of Angmering, Arundel, Sussex: the Prize of Five Sovereigns, for their 1 year 4 months and 2 weeks-old Shearling Ram; bred by exhibitors.

CLASS II.

William Rigden: the Prize of Twenty Sovereigns, for his 2 years and 4 months-old Ram: bred by exhibitor.

William Rigden: the Prize of Ten Sovereigns, for his 2 years and 4 months-old Ram; bred by exhibitor.

Lord Walsingham, of Merton Hall, Thetford, Norfolk; the Prize of Five Sovereigns, for his 2 years and 4 months-old Ram; bred by exhibitor.

Highly Commended.

Lord Walsingham: for his 3 years and 4 months-old Ram; bred by exhibitor.

Commended.

Lord Walsingham: for his 2 years and 4 months-old Ram; bred by exhibitor.

Lord Walsingham. for his 3 years and 4 months-old Ram; bred by exhibitor.

CLASS III.

The Duke of Richmond, of Goodwood, Chichester, Sussex: the Prize of Twenty Sovereigns, for his 16 months-old Shearling Ewes; bred by exhibitor.

Lord Walsingham, the Prize of Ten Sovereigns, for his 1 year and 4 months-old Shearling Ewes; bred by exhibitor.

The Earl of Radnor, of Coleshill House, Highworth, Wilts: the Prize of Five Sovereigns, for his 1 year and 4 months-old Shearling Ewes; bred by exhibitor.

Highly Commended.

John and Alfred Heasman: for their 1 year 4 months and 2 weeks-old Shearling Ewes, bred by exhibitors.

Commended.

John and Alfred Heasman: for their 1 year 4 months and 2 weeks-old Shearling Ewes; bred by exhibitors.

SHEEP: *Shropshire.*

CLASS I.

THOMAS HORTON, of Harnage Grange, Shrewsbury, Salop: the Prize of FIFTEEN SOVEREIGNS, for his 1 year 2 months and 2 weeks-old Shearling Ram; bred by exhibitor.

JAMES AND EDWARD CRANE, of Shrawardine, Shrewsbury, Salop: the Prize of TEN SOVEREIGNS, for their 1 year and 3 months-old Shearling Ram; bred by exhibitors.

ANNE BAKER, of Grendon, Atherstone, Warwickshire: the Prize of FIVE SOVEREIGNS, for his 1 year 3 months and 2 weeks-old Shearling Ram; bred by exhibitor.

HIGHLY COMMENDED.

ANNE BAKER: for her 1 year 3 months and 2 weeks-old Shearling Ram; bred by exhibitor.

COMMENDED.

JAMES AND EDWARD CRANE. for their 1 year and 3 months-old Shearling Ram bred by exhibitors.

THOMAS HORTON. for his 1 year and 4 months-old Shearling Ram; bred by exhibitor

THOMAS MANSELL, of Addcott, Shrewsbury, Salop for his 1 year 3 months and 1 week-old Shearling Ram; bred by exhibitor.

CLASS II.

EDWARD HOLLAND, M.P. of Dumbleton Hall, Evesham, Worcester: the Prize of FIFTEEN SOVEREIGNS, for his 3 years and 4 months-old Ram; bred by Mr. Byrd, Cross Lays Farm, Stafford.

THOMAS HORTON, the Prize of TEN SOVEREIGNS, for his 2 years and 4 months-old Ram; bred by exhibitor.

THOMAS HORLEY, jun., of The Fosse, Leamington, Warwickshire: the Prize of FIVE SOVEREIGNS, for his 2 years 3 months 2 weeks and 1 day-old Ram; bred by exhibitor.

HIGHLY COMMENDED.

WILLIAM ORME FOSTER, of Kinver Hill Farm, Stourbridge, Worcestershire for his 3 years and 3 months-old Ram; bred by exhibitor.

COMMENDED.

THOMAS HORTON: for his 2 years 3 months and 2 weeks-old Ram; bred by exhibitor.

WILLIAM ORME FOSTER: for his 2 years 3 months and 2 weeks-old Ram; bred by exhibitor.

CLASS III.

WILLIAM ORME FOSTER: the Prize of FIFTEEN SOVEREIGNS, for his 1 year and 3 months-old Shearling Ewes; bred by exhibitor.

JAMES AND EDWARD CRANE: the Prize of TEN SOVEREIGNS, for their 1 year 2 months and 3 weeks-old Shearling Ewes; bred by exhibitors.

JOHN EVANS, of Uffington, Shrewsbury, Salop: the Prize of FIVE SOVEREIGNS, for his 1 year and 3 months-old Shearling Ewes; bred by exhibitor.

HIGHLY COMMENDED.

JAMES AND EDWARD CRANE: for their 1 year 3 months and 1 week-old Shearling Ewes; bred by exhibitors.

COMMENDED.

JAMES AND EDWARD CRANE: for their 1 year 2 months and 3 weeks-old Shearling Ewes; bred by exhibitors.

THE EARL OF DARTMOUTH, of Patshull, Albrighton, Wolverhampton, Stafford: for his 1 year and 3 months-old Shearling Ewes; bred by exhibitor.

JOHN COXON, of Freeford, Lichfield, Stafford: for his 1 year 3 months and 2 weeks-old Shearling Ewes; bred by exhibitor.

SHEEP: *Long-woolled.*

CLASS I.

ROBERT GARNE, of Aldsworth, Northleach, Gloucestershire: the Prize of TWENTY SOVEREIGNS, for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.

WILLIAM LANE, of Broadfield Farm, Northleach, Gloucestershire: the Prize of TEN SOVEREIGNS, for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.

JAMES WALKER, of Northleach, Gloucestershire: the Prize of FIVE SOVEREIGNS, for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.

HIGHLY COMMENDED.

EDWARD HANDY, of Sierford, Cheltenham, Gloucestershire: for his 1 year 3 months and 2 weeks-old Shearling Ram; bred by exhibitor.

COMMENDED.

WILLIAM LANE: for his 1 year 4 months and 2 weeks-old Shearling Ram; bred by exhibitor.

ROBERT GARNE: for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.

ROBERT GARNE: for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.

CLASS II.

WILLIAM LANE: the Prize of TWENTY SOVEREIGNS, for his 3 years and 4 months-old Ram; bred by exhibitor.

JOHN KING TOMBS, of Langford, Lechlade, Gloucestershire: the Prize of TEN SOVEREIGNS, for his 3 years 3 months and 3 weeks-old Ram; bred by exhibitor.

ROBERT GARNE: the Prize of FIVE SOVEREIGNS, for his 3 years and 4 months-old Ram; bred by exhibitor.

HIGHLY COMMENDED.

WILLIAM LANE: for his 2 years and 3 months-old Ram; bred by exhibitor.

COMMENDED.

EDWARD HANDY: for his 4 years 3 months and 2 weeks-old Ram; bred by exhibitor.

ROBERT GARNE: for his 3 years and 4 months-old Ram; bred by exhibitor.

CLASS III.

GEORGE FLETCHER, of Shipton Sollars, Cheltenham, Gloucester: the Prize of TWENTY SOVEREIGNS, for his 1 year 3 months and 2 weeks-old Shearling Ewes; bred by exhibitor.

WILLIAM LANE: the Prize of TEN SOVEREIGNS, for his 1 year 3 months and 2 weeks-old Shearling Ewes; bred by exhibitor.

WILLIAM LANE: the Prize of FIVE SOVEREIGNS, for his 1 year 3 months and 1 week-old Shearling Ewes; bred by exhibitor.

HIGHLY COMMENDED.

GEORGE FLETCHER: for his 1 year 3 months and 2 weeks-old Shearling Ewes; bred by exhibitor.

COMMENDED.

WILLIAM LANE: for his 1 year and 3 months-old Shearling Ewes; bred by exhibitor.

SHEEP: *Short-woolled.*

CLASS I.

WILLIAM HUMFREY, of Oak Ash, Chaddleworth, Wantage, Berks: the Prize of TWENTY SOVEREIGNS, for his 1 year 5 months and 1 week-old Shearling Ram; bred by exhibitor.

STEPHEN KING, of Old Hayward Farm, Hungerford, Berks: the Prize of TEN SOVEREIGNS, for his 1 year 4 months and 2 weeks-old Shearling Ram; bred by exhibitor.

WILLIAM HUMFREY: the Prize of FIVE SOVEREIGNS, for his 1 year and 5 months-old Shearling Ram; bred by exhibitor.

HIGHLY COMMENDED.

JOHN BRYAN, of Southleigh, Witney, Oxfordshire; for his 1 year 4 months and 2 weeks-old Shearling Ram; bred by exhibitor.

JOHN BRYAN: for his 1 year 4 months and 2 weeks-old Shearling Ram; bred by exhibitor.

COMMENDED.

JOHN BRYAN; for his 1 year 4 months and 2 weeks-old Shearling Ram, bred by exhibitor.

JOHN BRYAN. for his 1 year 3 months and 2 weeks-old Shearling Ram; bred by exhibitor.

JOHN BRYAN: for his 1 year and 3 months-old Shearling Ram; bred by exhibitor.

CLASS II.

WILLIAM HUMFREY: the Prize of TWENTY SOVEREIGNS, for his 4 years 4 months and 1 week-old Ram; bred by exhibitor.

STEPHEN KING: the Prize of TEN SOVEREIGNS, for his 2 years 4 months and 2 weeks-old Ram; bred by exhibitor.

WILLIAM BROWNE CANNING, of Chiseldon, Swindon, Wiltshire: the Prize of FIVE SOVEREIGNS, for his 2 years 4 months and 3 weeks-old Ram; bred by exhibitor.

HIGHLY COMMENDED.

JOHN BRYAN: for his 3 years 4 months and 2 weeks-old Ram; bred by exhibitor

GEORGE HENRY BARNETT, of Glympton Park, Woodstock, Oxfordshire. for his 2 years 4 months and 2 weeks-old Ram; bred by exhibitor.

WILLIAM BROWNE CANNING. for his 2 years 4 months and 2 weeks-old Ram; bred by exhibitor.

WILLIAM HUMFREY: for his 3 years 3 months and 1 week-old Ram; bred by exhibitor.

COMMENDED.

JOSEPH DRUCE, of Eynsham, Oxfordshire: for his 2 years and 5 months-old Ram; bred by exhibitor.

JOHN BRYAN: for his 2 years 2 months and 2 weeks-old Ram; bred by exhibitor.

CLASS III.

William Humfrey: the Prize of Twenty Sovereigns, for his 1 year 5 months-old Shearling Ewes; bred by exhibitor.

Stephen King: the Prize of Ten Sovereigns for his 1 year 4 months and 2 weeks-old Shearling Ewes; bred by exhibitor.

John Washbourne Brown, of Uffcott, Swindon, Wilts, the Prize of Five Sovereigns, for his 1 year 5 months and 2 weeks-old Shearling Ewes; bred by exhibitor.

Highly Commended.

William Browne Canning for his 1 year 4 months and 2 weeks-old Shearling Ewes; bred by exhibitor.

Pigs.

CLASS I.

John Bullock, of Brick-lane, Bradford, Yorkshire: the Prize of Ten Sovereigns, for his 2 years 2 months and 3 weeks-old Boar; bred by George Haddison, Bolton House, Bradford, Yorkshire.

Samuel Woodhouse, of Norley Hall, Frodsham, Cheshire: the Prize of Five Sovereigns, for his 2 years 5 months and 1 week-old Boar; bred by exhibitor.

Highly Commended.

John Dyson, of the Adelphi Hotel, Dock-street, Leeds: for his 2 years and 1 week-old Boar; bred by Mr. Edon, Market-place, Barnsley.

CLASS II.

His Royal Highness the Prince Consort: the Prize of Ten Sovereigns, for his 2 years 4 months 1 week and 1 day-old Boar, small white breed; bred by exhibitor.

Lord Wenlock, of Escrick, Yorkshire: the Prize of Five Sovereigns, for his 10 months-old Boar, small white breed; bred by exhibitor.

Highly Commended.

John Harrison, jun, of Heaton Norris, Stockport, Lancashire for his 9 months 3 weeks and 6 days-old Boar, small white breed; bred by William Hall, of Manchester, Lancashire.

CLASS III.

Thomas Crisp, of Butley Abbey, Wickham-Market, Suffolk; the Prize of Ten Sovereigns, for his 1 year 3 weeks and 6 days-old Boar, improved black Suffolk; bred by exhibitor.

G. M. Sexton, of Wherstead Hall, Ipswich, Suffolk: the Prize of Five Sovereigns, for his 2 years 2 months and 3 days-old Boar, small black Suffolk; bred by exhibitor.

Highly Commended.

Thomas Crisp: for his 1 year 8 months and 3 weeks-old Boar, improved black Suffolk; bred by exhibitor.

CLASS IV.

George Brown, of No. 1, Burneston-place, Leeds, Yorkshire: the Prize of Ten Sovereigns, for his 11 months 2 weeks and 6 days-old Boar; bred by Luke Ellis, of Leeds, Yorkshire.

William B. Wainman, of Carhead, Cross Hills, Yorkshire: the Prize of Five Sovereigns, for his 1 year and 2 weeks-old Boar, Yorkshire middle breed; bred by exhibitor.

Highly Commended.

John Charlesworth, of Headfield, Dewsbury, Yorkshire: for his 2 years and 3 months-old Boar, middle breed; bred by exhibitor.

CLASS V.

William B. Wainman: the Prize of Ten Sovereigns, for his 3 years 4 months and 2 weeks-old Sow, Carhead large breed; bred by exhibitor.

W. J. Sadler, of Bentham and Calcott, Cricklade, Wiltshire: the Prize of Five Sovereigns, for his 2 years 4 months 1 week and 6 days-old breeding Sow; bred by exhibitor.

Highly Commended.

William B. Wainman: for his 2 years and 3 weeks-old Breeding Sow; bred by exhibitor.

CLASS VI.

William B. Wainman: the Prize of Ten Sovereigns, for his 2 years 2 months and 1 week-old Sow; bred by Mr. W. Davis, of Holme House, Gargrave, Yorkshire.

Mitchell Walton, of 6, Foundry-street, Halifax, Yorkshire: the Prize of Five Sovereigns, for his 1 year 1 week and 3 days-old Sow, small breed; bred by Henry Ambler, of Watkinson Hall, Halifax, Yorkshire.

Highly Commended.

Sir G. O. Wombwell, Bart., of Newburgh Park, Easingwold, Yorkshire for his 1 year 7 months and 4 days-old Sow, small white breed, bred by exhibitor.

The Class generally Commended.

CLASS VII.

William Hatton, of Addingham, Leeds, Yorkshire: the Prize of Ten Sovereigns, for his 1 year and 6 months-old Sow, small breed; bred by the Earl of Harewood, of Harewood, Leeds, Yorkshire.

Thomas Crisp: the Prize of Five Sovereigns, for his 3 years 1 month and 3 weeks-old Sow, Improved Black Suffolk; bred by exhibitor.

Highly Commended.

Thomas Crisp: for his 1 year 7 months 2 weeks and 4 days-old Sow, Improved Black Suffolk; bred by exhibitor.

CLASS VIII.

Joseph Norton, of Nortonthorpe Hall, Huddersfield, Yorkshire, the Prize of Ten Sovereigns, for his 1 year and 7 months-old Sow.

William B. Wainman: the Prize of Five Sovereigns, for his 4 years-old Sow, middle breed; bred by J. Coates, of Halifax, Yorkshire.

Highly Commended.

Michael Gavins, of Fox Inn, Woodhouse Carr, Leeds, Yorkshire, for his 2 years 9 months-old Sow, middle breed; bred by exhibitor.

CLASS IX.

The Rev. Henry G. Baily, of Swindon, Wiltshire: the Prize of Ten Sovereigns, for his 7 months 3 weeks and 6 days-old Breeding Sow-pigs (three); bred by exhibitor.

Henry S. M'Clintock, of Randalstown, Antrim: the Prize of Five Sovereigns, for his 4 months and 5 days-old Breeding Sow-pigs (three); bred by exhibitor.

CLASS X.

Lord Wenlock: the Prize of Ten Sovereigns, for his 6 months-old Breeding Sow-pigs (three), small white breed; bred by exhibitor.

Lord Wenlock: the Prize of Five Sovereigns, for his 7 months and 3 weeks-old Breeding Sow-pigs (three), small white breed; bred by exhibitor.

Highly Commended.

His Royal Highness the Prince Consort: for his 6 months 2 weeks and 1 day-old Breeding Sow-pigs (three), small white; bred by His Royal Highness.

CLASS XI.

Samuel Walton, of Kesgrave, Woodbridge, Suffolk: the Prize of Ten Sovereigns, for his 7 months 2 weeks and 4 days-old Breeding Sow-pigs (three); bred by exhibitor.

CLASS XII.

Joseph Gledhill, of Heckmondwike, Leeds, Yorkshire: the Prize of Ten Sovereigns, for his 6 months 3 weeks and 2 days-old Breeding Sow-pigs (three), middle breed; bred by exhibitor.

Special Prizes,

GIVEN BY THE LEEDS LOCAL COMMITTEE.

Cattle: *Dairy Cows.*

John R. Middlebrough, of South Milford, near Milford Junction, Yorkshire: the Prize of Ten Sovereigns, for his 10 years and 4 months-old Cow, Shorthorn, In-calf; bred by the Rev. J. Cator, of Womersley, Normington, Yorkshire.

Henry Ambler, of Watkinson Hall, Halifax, Yorkshire: the Prize of Five Sovereigns, for his 5 years-old Cow, Shorthorn, In-milk and In-calf; breeder unknown.

Light Horses.

CLASS I.

Walter Holdforth, of Burley, Leeds: the Prize of Twenty Sovereigns, for his 5 years and 2 months-old Blood Hunter; bred by James Holdforth, jun., of Kermincham Lodge, Congleton, Cheshire.

George Holmes, of Toll Gavel, Beverley, Yorkshire: the Prize of Ten Sovereigns, for his 5 years-old Blood Hunter; bred by Thomas McLain, of Alnwick, Northumberland.

Highly Commended.

John Batty, of Bishop Monkton, Ripon: for his 5 years-old Blood Hunter; bred by Mr. Robson, of Shires, Easingwold, Yorkshire.

Commended.

Sir George Strickland, Bart, of Boynton Bridlington, Yorkshire: for his 5 years and 3 months-old Blood Hunter; bred by exhibitor.

Class generally Commended.

CLASS II.

JOSEPH WHITWELL PEASE, of Woodlands, Darlington, Durham: the Prize of FIFTEEN SOVEREIGNS, for his 4 years-old Blood Hunter; bred by William Craddock, of Pinchinthorp Hall, Guisbro', Yorkshire.

RICHARD BOTTERILL, Garton, Driffield, Yorkshire: the Prize of FIVE SOVEREIGNS, for his 4 years-old Blood Hunter; breed unknown.

HIGHLY COMMENDED.

SIMEON MUSGRAVE, of Market Weighton, Yorkshire: for his 4 years-old Blood Hunter; bred by Mr. Gipson, of Brandesburton, Beverley, Yorkshire.

CLASS III.

THOMAS C. AND JOHN B. BOOTH, of Killerby, Catterick, Yorkshire: the Prize of FIVE SOVEREIGNS, for their 3 years-old Hunting Mare; bred by Mr. Thompson, of Aikban, Bedale, Yorkshire.

CLASS IV.

JAMES HARKER, of South Cliff, Hotham, Brough, Yorkshire: the Prize of TEN SOVEREIGNS, for his 3 years-old Coaching Stallion; bred by exhibitor.

CLASS VI.

CAPTAIN GUNTER, of the Grange, Wetherby, Yorkshire: the Prize of FIVE SOVEREIGNS, for his 4 years-old Coaching Brood Mare, In-foal; bred by Mr. Kirk, of New Village Grange, Howden, Yorkshire.

CLASS VII.

WILLIAM JACKSON, of St. Peters, Wiggen Hall, near Lynn, Norfolk; the Prize of TEN SOVEREIGNS, for his 6 years-old Roadster Stallion; bred by Benjamin Smith, of Deeping St. James, Market Deeping, Lincolnshire.

WILLIAM JOHNSON, of Billinghay, Sleaford, Lincolnshire: the Prize of FIVE SOVEREIGNS, for his 9 years-old Roadster Stallion; bred by exhibitor.

CLASS VIII.

JOHN WILSON, of Roundhay, near Leeds: the Prize of TEN SOVEREIGNS, for his 17 years-old Roadster Mare; bred by John Stone, of Balmby Dun, near Doncaster, Yorkshire.

CLASS IX.

WILLIAM CARVER, of Manchester: the Prize of TEN SOVEREIGNS, for his pair of 7 years-old dray geldings; breeder unknown.

CLASS X.

WILLIAM MOXON AND SONS, of Pontefract, Yorkshire: the Prize of TEN SOVEREIGNS, for their pair of 7 years-old Mares; bred by Samuel Hirst, of Kellington, Yorkshire.

JOSEPH NORTON, of Nortonthorpe Hall, Huddersfield, Yorkshire: the Prize of FIVE SOVEREIGNS, for his pair of 7 years and 6 years-old Mares; breeder unknown.

HIGHLY COMMENDED.

JOHN THOMAS PEARSON, of Parkside, Headingley, Leeds: for his Mare and Gelding, 12 years and 5 years old; breeder unknown.

COMMENDED.

JOSEPH NORTON, of Nortonthorpe Hall, Huddersfield, Yorkshire: for his pair of 6 years-old Mares; breeder unknown.

Duke of Newcastle, of Clumber Park, Worksop, Notts: for his Mare and Gelding; mare 9 years 3 months and 2 weeks old; bred by exhibitor; gelding 7 years 3 months 1 week and 3 days old; bred by exhibitor.

The Class generally Commended.

CLASS XI.

William Bramley, Amcoates, Bawtry, Lincolnshire: the Prize of Five Sovereigns, for his 3 years-old Gelding; bred by Robert Ragnall, of Newark.

CLASS XII.

Robert Garside, of 3, Elmwood-place, Leeds: the Prize of Five Sovereigns, for his 3 years-old Mare; bred by exhibitor.

CLASS XIII.

Francis Cook Matthews, of Great Driffield, Yorkshire: the Prize of Five Sovereigns, for his 7 years-old Gelding Pony; breeder unknown.

Highly Commended.

William Ingham, of Limestead Gannery, Armley, Leeds: for his 4 years-old Gelding Pony, breeder unknown.

George Holmes, of Toll Gavel, Beverley, Yorkshire: for his 5 years-old Gelding Pony; bred by Mr. Cook, Long Witton, near Lincoln.

Commended.

Robert Johnson, of Bridge-street, Gainsboro', Lincolnshire: for his 6 years-old Gelding Pony, breeder unknown.

CLASS XIV.

James Abbey, of Crimple, Knaresboro', Yorkshire: the Prize of Five Sovereigns, for his 7 years-old Mare Pony; breeder unknown.

CLASS XV.

James Witham, of Gledhow, Leeds, Yorkshire: the Prize of Five Sovereigns, for his 7 years-old Mare Pony; breeder unknown.

Commended.

John George Taylor, of Shipley, Yorkshire for his 3 years-old Mare P bred by exhibitor.

John George Taylor, for his 4 years-old Mare Pony; bred by exhibitor.

Sheep: *Long-woolled.*

CLASS I.

John Lynn, of Church Farm, Stroxton, Grantham, Lincolnshire: the Prize of Ten Sovereigns, for his 1 year and 4 months-old Shearling Ram; bred by exhibitor.

CLASS II.

Joseph Simpson, of Spofforth Park, Wetherby, Yorkshire: the Prize of Ten Sovereigns, for his 2 years and 3 months-old Ram; bred by Mr. Beal, Malton, Yorkshire.

SHEEP: *Mountain.*

CLASS II.

THE HON. COLONEL PENNANT, M.P., of Penrhyn Castle, Bangor, Carnarvonshire: the Prize of FIVE SOVEREIGNS, for his Pen of five Cheviot Ewes, 3 years and 3 months old; bred by exhibitor.

CLASS III.

NICHOLAS BARKER, of Bransdale, Kirby Moorside, N. R. Yorkshire: the Prize of FIVE SOVEREIGNS, for his 3 years and 1 month-old blackfaced Ram; bred by exhibitor.

CLASS IV.

SAMUEL NEWALL, of Eastby, Skipton, Yorkshire: the Prize of FIVE SOVEREIGNS, for his Pen of five blackfaced Ewes, 3 years and 3 months old.

CLASS V.

JONATHAN PEEL, of Knowlmere Manor, Clitheroe, Yorkshire: the Prize of FIVE SOVEREIGNS, for his 6 years and 3 months-old Louk Ram; bred by William Widdup, of Hould Top, Silsden, Skipton, Yorkshire.

CLASS VI.

JONATHAN PEEL: the Prize of FIVE SOVEREIGNS, for his Pen of five 2 years and 3 months-old Louk Ewes; bred by Francis Stirk, of Skipton, Yorkshire.

HIGHLY COMMENDED.

DAVID LAMBERT, of Silsden, Keighley, Yorkshire: for his three Ewes 4 years-old, one Ewe 6 years-old, one Ewe 2 years-old; breeder unknown.

PRIZES OFFERED BY LORD LONDESBOROUGH.

SIMEON MUSGRAVE, of Market-Weighton, E. R. Yorkshire: the Prize of TWENTY SOVEREIGNS, for his 3 years-old Hunting Colt; bred by Wilson Whiting, of Leven, Beverley, Yorkshire.

HIGHLY COMMENDED.

RICHARD THOMAS, of The Crwys Farm, Cardiff, Glamorganshire: for his 3 years-old Hunting Colt, bred by B. H. Cuthbertson, of Cefn, Llech, Llangibby, Newport, Monmouthshire.

WILLIAM LOVEL, of Nafferton Grange, Driffield, Yorkshire: the Prize of TEN SOVEREIGNS, for his Pen of five Leicester Ewes, four and five shears; bred by exhibitor.

HIGHLY COMMENDED.

GEORGE WALMSLEY, of Rudston, Bridlington, Yorkshire: for his Pen of five Leicester Ewes, two and three shears; bred by exhibitor.

IMPLEMENTS.

STEAM-CULTIVATORS.

JOHN FOWLER, JUN., 28, Cornhill, London: the Prize of FIFTY SOVEREIGNS, for his 12-Horse Power Steam-cultivating Apparatus and Plough, suitable for Ploughing Land of all descriptions; manufactured by William Hewitson, John Fowler, and James Ketson, Leeds.

JOHN FOWLER, JUN.: the Prize of FIFTY SOVEREIGNS, for his Steam-cultivating Apparatus and Plough, suitable for Scarifying, Grubbing, and Breaking-up Land of all descriptions; manufactured by William Hewitson, John Fowler, and James Ketson, Leeds.

JOHN FOWLER, JUN.: the Prize of FIFTY SOVEREIGNS, for his Steam-cultivating Apparatus and Plough, with 8-Horse Power Portable Steam-engine (worked at 10-Horse Power), suitable for Ploughing Land of all descriptions; manufactured by William Hewitson, J. Fowler, and James Ketson, Leeds.

JOHN FOWLER, JUN.: the Prize of TWENTY-FIVE SOVEREIGNS, for his Steam-cultivating Apparatus and Plough, with 8-Horse Power Portable Steam-engine (worked at 10-Horse power), suitable for Scarifying, Grubbing, or Breaking-up Land of all descriptions: manufactured by William Hewitson, John Fowler, and James Ketson, Leeds.

JAMES AND FREDERICK HOWARD, Britannia Iron Works, Bedford: the Prize of TWENTY-FIVE SOVEREIGNS, for their Set of Patent Apparatus for Cultivating Land by Steam-power, which may be attached to any ordinary Portable Steam-Engine, and used for working Steam Ploughs or Cultivators, and also for a set of Ploughs and a Cultivator, which may be used on mixed and light soils, having a level surface; invented and manufactured by themselves.

MEDALS.

EDWARD HAYES, of Watling Works, Stony Stratford, Buckinghamshire: a Silver Medal for his Patent Self-Acting Windlass, which may be attached to any ordinary Portable Steam-Engine, and used for Steam Cultivation; invented, improved, and manufactured by himself.

ROBEY AND CO., of Lincoln: a Silver Medal for their 12-Horse Power Portable Double Cylinder Steam Engine, with Chandler and Oliver's Patent Drum Ploughing Windlass, suitable for Steam Cultivation; invented by Chandler and Oliver, of Bow, and improved and manufactured by themselves.

DRILLS.

JAMES COULTAS, JUN., of Spittlegate, Grantham, Lincolnshire: the Prize of TEN SOVEREIGNS, for his General Purpose Drill; invented, improved, and manufactured by himself.

JAMES COULTAS AND SON, of Little Gonerby Iron Works, Grantham, Lincolnshire: the Prize of THREE SOVEREIGNS, for his General Purpose Corn, Seed, and Manure Drill; invented by James Coultas, sen., and improved and manufactured by themselves.

ROBERT AND JOHN REEVES, of Bratton Iron Works, Westbury, Wiltshire: the Prize of TWO SOVEREIGNS, for their General Purpose Corn and Manure Drill, with improved fore-steerage; invented, improved, and manufactured by themselves.

JAMES COULTAS, JUN.: the Prize of TEN SOVEREIGNS, for his Corn, Seed, and Root Drill; invented, improved, and manufactured by himself.

Holmes and Sons, of Prospect Place Works, Norwich: the Prize of Five Sovereigns, for his Corn Drill; invented, improved, and manufactured by themselves.

James Coultas, Jun.: the Prize of Five Sovereigns, for his General Purpose Drill and Steerage for small occupations; invented, improved, and manufactured by himself.

William Hensman and Son, of Linslade Works, Leighton Buzzard, Bedfordshire: the Prize of Five Sovereigns, for their Steerage Corn, Turnip, and Mangold Drill; invented, improved, and manufactured by themselves.

Holmes and Sons, of Prospect Place Works, Norwich: the Prize of Ten Sovereigns, for their Drill for Turnips and other Roots (on ridge and flat); improved and manufactured by themselves.

R. and J. Reeves: the Prize of Five Sovereigns, for their Drill for Turnips and other Roots (on ridge and flat); invented, improved, and manufactured by themselves.

James Coultas, Jun.: the Prize of Six Sovereigns, for his Drill for Turnips and other Roots (on flat only); invented, improved, and manufactured by himself.

Priest and Woolnough, of Kingston-on-Thames, Surrey: the Prize of Four Sovereigns, for their Drill for Turnips and other Roots (on flat only), invented, improved, and manufactured by themselves.

A. W. Gower and Son, of Britannia Iron Works, Market Drayton, Shropshire: the Prize of Five Sovereigns, for their Drill for Turnips and other Roots (on ridge only); invented, improved, and manufactured by themselves.

R. and J. Reeves: the Prize of Seven Sovereigns, for their Liquid Manure Drill; invented by Thomas Chandler of Aldbourne, and improved and manufactured by themselves.

William Watkinson, of Louth, Lincolnshire: the Prize of Three Sovereigns, for his Liquid Manure Drill (on ridge or flat); invented by Thomas Chandler, of Aldbourn, Wiltshire; improved and manufactured by himself.

James Coultas, Jun: the Prize of Seven Sovereigns, for his Small Seed and Rye Grass Drill; invented, improved, and manufactured by himself.

Holmes and Sons, of Prospect Place Works, Norwich, Norfolk: the Prize of Three Sovereigns, for their Small Seed Drill for Grass Seeds and Saintfoin; invented, improved, and manufactured by themselves.

William Hensman and Son: the Prize of Seven Sovereigns, for their Land Presser, with Drill and Hoes attached; improved and manufactured by themselves.

George William Robinson, of Barton-upon-Humber, Lincolnshire: the Prize of Three Sovereigns, for his Improved Three-Row Drill Presser; improved and manufactured by himself.

Thomas Chambers, Jun., of Colkirk Hall, near Fakenham, Norfolk: the Prize of Seven Sovereigns, for his Patent Broadcast Manure Distributor invented and improved by himself, and manufactured by Messrs. Garrett and Son.

Holmes and Son: the Prize of Three Sovereigns, for their Dry Manure Distributor; invented, improved, and manufactured by themselves.

The Trustees of W. Crosskill, of Beverley Iron Works, Beverley, Yorkshire: the Prize of Six Sovereigns, for their Liquid Manure Distributor; improved and manufactured by themselves.

Isaac James, of Tivoli Works, Cheltenham, Gloucestershire: the Prize of Four Sovereigns, for his Liquid Manure Distributor; invented, improved, and manufactured by himself.

Highly Commended.

James Coultas and Son: for their Corn Drill; invented by James Coultas, sen., and improved and manufactured by the exhibitors.

Holmes and Son: for their Drill for general purposes for small occupations; invented, improved, and manufactured by themselves.

James Coultas, Jun.: for his Corn Drill for small occupations; invented, improved, and manufactured by himself.

Priest and Woolnough; for their Dry Manure Distributor; invented and manufactured by themselves.

R. and J. Reeves: for their Dry Manure Distributor; invented, improved, and manufactured by themselves.

Commended.

Priest and Woolnough: for their Corn Drill; improved and manufactured by themselves.

George Malthouse, of Providence Works, Coltsgate Hill, Ripon, Yorkshire: for his General Purpose Drill for small occupations.

R. and J. Reeves. for their General Purpose Drill, for small occupations; invented, improved, and manufactured by themselves.

James Coultas, Jun.: for his Dry Manure Distributor; invented, improved, and manufactured by himself.

Horse-Hoes.

Priest and Woolnough: the Prize of Seven Sovereigns, for their General Purpose Horse-hoe; invented, improved, and manufactured by themselves.

Hurst and Pickering, of Goulding Works, Leicestershire: the Prize of Five Sovereigns, for their General Purpose Horse-hoe; improved and manufactured by themselves.

Isaac Spight, of Brigg, Lincolnshire: the Prize of Three Sovereigns, for his General Purpose Horse-hoe; invented, improved, and manufactured by himself.

Carson and Toone, of Wiltshire Foundry, Warminster, Wilts: the Prize of Five Sovereigns, for their Single Row Horse-hoe, for ridge and flat; invented by the late Hugh Carson, of Warminster, improved and manufactured by themselves.

The Busby Agricultural Implement Company, of Newton-le-Willows, Bedale, Yorkshire: the Prize of Three Sovereigns, for their Single Row Horse-hoe, for ridge and flat: invented and improved by William Busby, of Newton-le-Willows, and manufactured by themselves.

Edward Page and Co., of Bedford: the Prize of Two Sovereigns, for their Single Row Horse-hoe, for ridge and flat; invented and manufactured by themselves.

John Eaton, of Tywell Works, Thrapston, Northamptonshire: the Prize of Two Sovereigns, for his Horse-hoe for thinning Turnips, invented and manufactured by himself.

Commended.

J. and F. Howard, of Britannia Iron Works, Bedford: for their Horse-hoe, for single drill ridge and flat, invented and manufactured by themselves.

Holmes and Son. for their General Purpose Horse-hoe; invented, improved, and manufactured by themselves.

Thomas Allcock, of Radcliffe-on-Trent, Notts: for his Horse-hoe, for single drill ridge and flat; invented and manufactured by himself.

Jonathan Stalker, of Penrith, Cumberland: for his Horse-hoe, for single drill ridge and flat; invented, improved, and manufactured by himself.

William Smith, of Kettering, Northamptonshire: for his General Purpose Horse-hoe; invented, improved, and manufactured by himself.

HORSE-RAKES.

J. AND F. HOWARD: the Prize of TEN SOVEREIGNS, for their Horse Rake; invented and manufactured by themselves.

HAYMAKING MACHINES.

J. AND F. HOWARD: the Prize of SIX SOVEREIGNS, for their Hay-making Machine; invented and manufactured by themselves.

W. N. NICHOLSON, of Newark-on-Trent, Nottinghamshire: the Prize of FOUR SOVEREIGNS, for his Hay-making Machine; invented, improved, and manufactured by himself.

GRASS-MOWING MACHINES.

W. M. CRANSTON, of 58, King William Street, London Bridge: the Prize of EIGHT SOVEREIGNS, for his Grass-Mowing Machine (not combined); invented and manufactured by Walter A. Wood, of Hoosick Falls, New York.

BURGESS AND KEY, of 95, Newgate Street, London: the Prize of SEVEN SOVEREIGNS, for their GRASS-MOWING MACHINE (not combined); invented by W. Burgess, of 95, Newgate Street, and manufactured by the exhibitors.

HENRY BUSHELL, General Manager for the North of England Implement Company, York: the Prize of FIVE SOVEREIGNS, for their Grass-Mowing Machine (not combined); invented by Mr. Ball, Ohio, United States; improved and manufactured by B. Samuelson, Britannia Works, Banbury.

WAGGONS AND CARTS.

THOMAS MILFORD AND SON, of the West of England Wheel Works, Thorverton, Collumpton, Devonshire: the Prize of SEVEN SOVEREIGNS, for their Pair Horse Waggon; invented, improved, and manufactured by themselves.

THE TRUSTEES OF WILLIAM CROSSKILL: the Prize of THREE SOVEREIGNS, for their Pair Horse Waggons; invented by W. Crosskill, improved and manufactured by the exhibitors.

THE TRUSTEES OF WILLIAM CROSSKILL: the Prize of SEVEN SOVEREIGNS; for their other Waggons; improved and manufactured by the exhibitors.

THOMAS MILFORD AND SON: the Prize of THREE SOVEREIGNS, for their Waggons; invented, improved, and manufactured by themselves.

THE TRUSTEES OF WILLIAM CROSSKILL: the Prize of SIX SOVEREIGNS, for their Single Horse Carts; improved and manufactured by the exhibitors.

THOMAS MILFORD AND SON: the Prize of TWO SOVEREIGNS, for his Single Horse Carts; invented, improved, and manufactured by themselves.

THE BUSBY AGRICULTURAL IMPLEMENT COMPANY: the Prize of ONE SOVEREIGN for their Single Horse Carts; invented by W. Lister, Dunsa Bank, Richmond; improved by W. Busby, and manufactured by the exhibitors.

THE TRUSTEES OF WILLIAM CROSSKILL: the Prize of SIX SOVEREIGNS, for their Two Horse Carts; improved and manufactured by themselves.

JOHN SPENCER, of Doncaster, Yorkshire; the Prize of TWO SOVEREIGNS, for his Two Horse Carts; invented, improved, and manufactured by himself.

JOHN BARKER, of Dunnington, York; the Prize of TWO SOVEREIGNS; for his Two Horse Carts; invented and manufactured by himself.

THE TRUSTEES OF WILLIAM CROSSKILL: the Prize of FIVE SOVEREIGNS, for their Harvest Cart; invented by J. Hannam, Esq., of Burcott Park, Oxon; improved and manufactured by the exhibitors.

PUCKERING AND HOULGATE, of Beverly and Scarborough, Yorkshire: the Prize of THREE SOVEREIGNS, for their Market or Sporting Cart, improved and manufactured by themselves.

Trustees of William Crosskill: the Prize of Two Sovereigns, for their Light Spring Cart; improved and manufactured by themselves.

Commended.

Edmund Bulled, of Witheridge, Devonshire. for his Pair Horse Waggon; invented, improved, and manufactured by himself.

Hayes and Son, of Scotgate Works, Stamford, Lincolnshire, for their One-horse Cart; invented, improved, and manufactured by themselves.

MISCELLANEOUS.

Medals.

Wilkinson, Wright, and Co., of Boston, Lincolnshire: a Silver Medal for their Straw Elevator; invented and manufactured by themselves.

R. and J. Reeves: a Silver Medal for their Patent Weeding Paddle or Thistle Destroyer, invented, improved, and manufactured by the exhibitors.

Samson and Jewell, of St. Heliers, Jersey: a Silver Medal for their Combined Paring and Breaking Cultivator, invented by William H. Samson, of Jersey; and manufactured by Gallichan, of Jersey.

Musgrave Brothers, Ann-street Iron Works, and 59, High-street, Belfast, Ireland. a Silver Medal for their Iron Cow House Fittings, invented and manufactured by themselves.

W. S. Underhill, of Newport, Salop: a Silver Medal for his Patent Sheep Rack; invented, improved, and manufactured by himself.

Mitton and Co., of Lincoln: a Silver Medal for their Rotary Corn Screen, with adjustable wires; invented, improved, and manufactured by themselves.

Samuel Denison and Son, Sidney-street, Vicar-lane, Leeds, Yorkshire: a Silver Medal for their Waggon Weighing Machine; invented by Samuel Denison; and manufactured by the exhibitors.

Highly Commended.

Musgrave Brothers. for their Patent Iron Cow House Fittings, invented and manufactured by themselves.

Commended.

H. J Morton and Co., of Basinghall-street, Leeds, Yorkshire for their Cattle, Cart, or Implement Shed, manufactured by themselves.

E. H Bentall, of Heybridge, near Maldon, Essex for his Patent Turnip Cutter for Beasts (marked R C A); invented, improved, and manufactured by himself

E. H Bentall for his Patent Bean Kibblers (marked B K C); invented, improved, and manufactured by himself.

E H Bentall for his Turnip Cutter for Sheep (marked R C A), invented, improved, and manufactured by himself.

Spear and Jackson, of Etna Works, Sheffield, Yorkshire for their Cast Steel Digging Spades invented, improved, and manufactured by themselves

James Burnley and William Nichols, of Old Victoria Foundry, Leeds, Yorkshire for their Flax Straw Breaking Machine, invented by Henry Gardner, Leeds, and improved and manufactured by themselves.

Francis Morton and Co., of James-street, Liverpool, Lancashire: for their Removable Shed Roof, invented by Francis Morton; and manufactured by the exhibitors.

William Scott Underhill, Newport, Salop: for his Grain Elevator; invented and patented by John and Henry Bruckshaw and W. S. Underhill, and manufactured by the exhibitor.

PRIZES GIVEN BY THE LEEDS LOCAL COMMITTEE.

CHEESE.

THOMAS DAWKINS APPLEBY, of 61, Briggate, Leeds: the Prize of FIVE SOVEREIGNS, for his Cheese, weighing not less than 28 lbs, nor less than 6 months old.

THOMAS DAWKINS APPLEBY the Prize of THREE SOVEREIGNS, for his Cheese, weighing not less than 28 lbs.; nor less than 6 months old.

BENJAMIN ATKINSON, of Manston Lodge, Whitkirk, near Leeds: the Prize of THREE SOVEREIGNS, for his 6 Cream Cheeses

BUTTER.

MARY ABBEY, of Crimple, Knaresborough, York: the Prize of FIVE SOVEREIGNS, for her Best, one or more, rolls or pats of Butter, weighing not less than 20 lbs

WILLIAM BRADLEY WAINMAN, of Carhead, Cross Hills, Yorkshire: the Prize of THREE SOVEREIGNS, for his Best, one or more, rolls or pats of Butter, weighing not less than 5 lbs.

WOOL.

ELIZABETH BARROBY, of Dishforth, Thirsk, Yorkshire: the Prize of TEN SOVEREIGNS, for her Six Fleeces of Long-woolled Leicester, shorn from sheep 1 year old.

CHRISTOPHER BARROBY, of Baldersby, Thirsk, Yorkshire: the Prize of TEN SOVEREIGNS, for his Six Fleeces of Long-woolled Leicester, shorn from sheep 1 year old.

MESSRS. T. C AND J. B. BOOTH, of Killerby, Catterick, Yorkshire: the Prize of TEN SOVEREIGNS, for their Six Fleeces of Leicester, shorn from two or three shear sheep.

CHRISTOPHER BARROBY: the Prize of FIVE SOVEREIGNS, for his Six Fleeces of Longwoolled Leicester, shorn from sheep 2 or 4 years old.

MESSRS. T. C. and J. B. BOOTH: the Prize of TEN SOVEREIGNS, for their Six Fleeces of Leicester, shorn from two and three shear sheep.

CHRISTOPHER BARROBY: the Prize of FIVE SOVEREIGNS, for his Six Fleeces of Long-woolled Leicester, shorn from sheep 2 to 4 years old.

THOMAS HORTON, of Harnage Grange, Shrewsbury, Salop: the Prize of TEN SOVEREIGNS, for his Six Fleeces of Shropshire, shorn from sheep about 13 months old.

ANN BAKER, of Grendon, Atherstone, Warwick: the Prize of FIVE SOVEREIGNS, for her Shropshire Down, shorn from sheep 1 year and 2 months old

THOMAS HORTON: the Prize of TEN SOVEREIGNS, for his Shropshire, shorn from sheep 2 years old and upwards.

EDWARD HOLLAND, of Dumbleton Hall, Evesham, Gloucestershire: the Prize of FIVE SOVEREIGNS, for his Shropshire, shorn from sheep of various ages.

LORD WALSINGHAM, Merton Hall, Thetford, Norfolk: the Prize of TEN SOVEREIGNS, for his Southdown, shorn from sheep 14 months old.

LORD SONDES, of Elmham Hall, Thetford, Norfolk: the Prize of FIVE SOVEREIGNS, for his pure Southdown, shorn from sheep 15 months old.

LORD WALSINGHAM: the Prize of TEN SOVEREIGNS, for his Southdown, shorn from sheep 26 months old.

LORD SONDES: the Prize of FIVE SOVEREIGNS, for his pure Southdown, shorn from sheep 2 to 4 years old.

COMMENDED.

LORD WALSINGHAM · for his Southdown, shorn from sheep 26 months old.

Flax.

James Manning, of Trent House, Gainsborough, Lincolnshire: the Prize of Nine Sovereigns, for his Green Flax, grown on warp soil, from Riga seed once grown in England; 2 bushels per acre.

Lord Kinnaird, of Rossie Priory, Inchture, Perth: the Prize of Six Sovereigns, for his Green Flax, grown on alluvial clay, Dutch seed; 2 bushels per acre.

James Manning: the Prize of Twelve Sovereigns, for his Green Flax, grown on warp soil, from Riga seed once grown in England; 2 bushels per acre.

Thomas Large Henley, of South Place, Calne, Wiltshire: the Prize of Fifteen Sovereigns, for his Green Flax, grown from English seed; 2 bushels per acre.

James Manning: the Prize of Ten Sovereigns, for his Green Flax, grown on warp soil, from Riga seed; 2 bushels per acre.

John Wells, of Booth-Ferry House, Howden, Yorkshire: the Prize of Five Sovereigns, for his Green Flax, grown on old warp land, from barrel seed; 2 bushels per acre.

James Garth and Arthur Marshall, of the Patrington Flax Works, Patrington, Hull, Yorkshire: the Prize of Twenty Sovereigns, for their Prepared Flax, mill scutched, 5 cwt.

Robert Chase, of Eye, Suffolk: the Prize of Ten Sovereigns, for his Prepared Flax, mill scutched, 5 cwt.

Richard Bielby, of Crambeck Welborn, Yorkshire: the Prize of Five Sovereigns, for his Prepared Flax, mill scutched, 5 cwt., grown from Riga seed; 2 bushels per acre.

Richard Bielby: the Prize of Twenty Sovereigns, for his Prepared Flax, hand scutched, 5 cwt., grown from Riga seed; 2 bushels per acre.

James Manning: the Prize of Ten Sovereigns, for his Prepared Flax, hand scutched, 5 cwt., grown on warp land, from English seed, sown 10th April, 1860; 2 bushels per acre.

James Beachell, of Rawcliffe, Selby, Yorkshire: the Prize of Five Sovereigns, for his Prepared Flax, hand scutched, 5 cwt., grown on old warp land, from English white flower seed; 2 bushels per acre.

Essays and Reports.

AWARDS FOR 1859.

Class IV.

The Essays in this Class were not considered worthy of the Prize offered.

Class VIII.

The Essays in this Class were not considered worthy of the Prize.

Class IX.

The Prize of 10*l.* was awarded to Professor Tanner, for his Essay on the Breeding of Farm Stock.

AWARDS FOR 1860.

Class VI.

The Essays in this Class were not considered worthy of the Prize.

Class VIII.

The Prize of 10*l.* was awarded to Messrs. Raynbird, of Haslewood Park, Basingstoke, for the best Essay on the Adulteration of Seeds.

Class IX.

The Essays in this Class were not considered worthy of the Prize offered.

AWARDS FOR 1861.

Class I.

The Earl of Powis' special Prize of 50*l.* was awarded to Mr. William Wright, of Sigglesthorne Hall, for his Report on the Improvement in the Farming of Yorkshire since the date of the last Reports in the Journal.

Class II.

The Prize of 50*l.* was awarded to the Rev. J. Wilkinson, of Broughton Gifford Rectory, for the best Report on the Agriculture of Hampshire.

Class III.

In this Class (Drainage) there was no competition.

Class VI.

The Prize of 10*l.* was awarded to Mr. Thomas Bowie, of Stoneleigh Abbey Farm, for the best Essay on the Rearing of Calves.

The Essay by Major Stanley McClintock, of Randal's Town, Ireland, was commended.

Class VII.

The Prize of 10*l.* was awarded to Mr. Peter Love, of Northampton, for the best Essay on Harvesting Corn.

Class VIII.

The Prize of 10*l.* was awarded to Mr. Charles Wratislaw, late of Woolscott, near Rugby, for the best Essay on Farm Capital.

The Essay by Mr. Archibald Smith, of Edinburgh, on the Home Manufacture of Portable Manures, was commended.

Essays and Reports.—PRIZES FOR 1862.—All Prizes of the Royal Agricultural Society of England are open to general competition. Competitors will be expected to consider and discuss the heads enumerated.

I. AGRICULTURE OF STAFFORDSHIRE.

FIFTY SOVEREIGNS will be given for the best Report on the Agriculture of Staffordshire.

The principal geological and physical features of the county should be described; the nature of the Soil and character of the Farming in its different districts or natural divisions; its Live Stock; Implements; recent changes of Farm Management; Improvements lately introduced and still required; remarkable or characteristic Farms; the influences exercised by neighbouring mines and factories on the cropping of the soil, the value of land, the rate of prices and wages, and on the demand for timber, and consequently on the profitable management of woods and plantations.

II. SUBSOILING VERSUS DOUBLE-PLOUGHING.

TWENTY SOVEREIGNS will be given for the best Essay on the comparative merits of Subsoiling, Trenching, and Double-Ploughing.

The comparative cost of these several modes of cultivation; their influence on different crops, on the germination of seed-weeds, and the destruction of root-weeds; the supplies of manure required in each case are to be contrasted, and the most seasonable manner of conducting the work described.

III. STEAM-POWER AND THRESHING-MACHINES.

TWENTY SOVEREIGNS will be given for the best Essay on the comparative advantages of Fixed or Moveable Steam-Power, and of the Single and Double Dressing Threshing-Machine.

The cost of repairs and allowance required for depreciation in each case are to be carefully examined; the labour and waste incidental to threshing in the field and in the barn; and the applicability of the steam-power to other purposes should be contrasted: in the case of the threshing-machines, the weight of the machine and the requirements of the market in respect of samples should be considered.

IV. HAYMAKING.

TEN SOVEREIGNS will be given for the best Essay on Recent Improvements in Haymaking.

V.

TEN SOVEREIGNS will be given for the best Essay on any other Agricultural Subject.

Some further subjects for prizes will probably be announced in the Agricultural newspapers in November, as well as in the next Number of this Journal.

Reports or Essays competing for the Prizes must be sent to the Secretary of the Society, at 12, *Hanover Square, London, on or before March* 1, 1862. *Contributors of Papers are requested to retain Copies of their Communications, as the Society cannot be responsible for their return.*

RULES OF COMPETITION FOR PRIZE ESSAYS.

1. All information contained in Prize Essays shall be founded on experience or observation, and not on simple reference to books or other sources. Competitors are requested to use foolscap or large letter paper, and not to write on both sides of the leaf.

2. Drawings, specimens, or models, drawn or constructed to a stated scale, shall accompany writings requiring them.

3. All competitors shall enclose their names and addresses in a sealed cover, on which only their motto, the subject of their Essay, and the number of that subject in the Prize List of the Society, shall be written.*

4. The President or Chairman of the Council for the time being shall open the cover on which the motto designating the Essay to which the Prize has been awarded is written, and shall declare the name of the author.

5. The Chairman of the Journal Committee shall alone be empowered to open the motto-paper of any Essay not obtaining the Prize, that he may think likely to be useful for the Society's objects; with a view of consulting the writer confidentially as to his willingness to place such Essay at the disposal of the Journal Committee.

6. The copyright of all Essays gaining Prizes shall belong to the Society, who shall accordingly have the power to publish the whole or any part of such Essays; and the other Essays will be returned on the application of the writers; but the Society do not make themselves responsible for their loss.

7. The Society are not bound to award a prize unless they consider one of the Essays deserving of it.

8. In all reports of experiments the expenses shall be accurately detailed.

9. The imperial weights and measures only are those by which calculations are to be made.

10. No prize shall be given for any Essay which has been already in print.

11. Prizes may be taken in money or plate, at the option of the successful candidate.

12. All Essays must be addressed to the Secretary, at the house of the Society.

*** Competitors are requested to write their motto on the enclosed paper on which their names are written, as well as on the outside of the envelope.**

Members' Privileges of Chemical Analysis.

THE Council have fixed the following rates of Charge for Analyses to be made by the Consulting Chemist for the *bonâ-fide* use of Members of the Society; who (to avoid all unnecessary correspondence) are particularly requested, when applying to him, to mention the kind of analysis they require, and to quote its number in the subjoined schedule. The charge for analysis, together with the carriage of the specimens, must be paid to him by members at the time of their application.

No. 1.	—An opinion of the genuineness of Peruvian guano, bone-dust, or oil-cake (each sample)	5*s.*
„ 2.	—An analysis of guano; showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts, and ammonia	10*s.*
„ 3.	—An estimate of the value (relatively to the average of samples in the market) of sulphate and muriate of ammonia, and of the nitrates of potash and soda	10*s.*
„ 4.	—An analysis of superphosphate of lime for soluble phosphates only	10*s.*
„ 5.	—An analysis of superphosphate of lime, showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia	£1.
„ 6.	—An analysis (sufficient for the determination of its agricultural value) of any ordinary artificial manure	£1.
„ 7.	—Limestone:—the proportion of lime, 7*s.* 6*d.*; the proportion of magnesia, 10*s.*; the proportion of lime and magnesia	15*s.*
„ 8.	—Limestone or marls, including carbonate, phosphate, and sulphate of lime, and magnesia with sand and clay	£1.
„ 9.	—Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	£1.
„ 10.	—Complete analysis of a soil	£3.
„ 11.	—An analysis of oil-cake, or other substance used for feeding purposes; showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre; as well as of starch, gum, and sugar, in the aggregate	£1.
„ 12.	—Analyses of any vegetable product	£1.
„ 13.	—Analyses of animal products, refuse substances used for manure, &c.	from 10*s.* to 30*s.*
„ 14.	—Determination of the "hardness" of a sample of water before and after boiling	10*s.*
„ 15.	—Analysis of water of land drainage, and of water used for irrigation	£2.
„ 16.	—Determination of nitric acid in a sample of water	£1.

N.B.—*The above Scale of Charges is not applicable to the case of persons commercially engaged in the Manufacture or Sale of any Substance sent for Analysis.*

The Address of the Consulting Chemist of the Society is, Dr. AUGUSTUS VOELCKER, Cirencester, Gloucestershire, to which he requests that all letters and parcels (postage and carriage paid) should be directed: for the convenience, however, of persons residing in London, parcels sent to the Society's Office, No. 12, Hanover Square, W., will be forwarded to Cirencester once or twice a week.

Members' Veterinary Privileges.

I.—SERIOUS OR EXTENSIVE DISEASES.

No. 1. Any Member of the Society who may desire professional attendance and special advice in cases of serious or extensive disease among his cattle, sheep, or pigs, and will address a letter to the Secretary, will, by return of post, receive a reply stating whether it be considered necessary that Professor Simonds, the Society's Veterinary Inspector, should visit the place where the disease prevails.

No. 2. The remuneration of the Inspector will be 2*l*. 2*s*. each day as a professional fee, and 1*l*. 1*s*. each day for personal expenses; and he will also be allowed to charge the cost of travelling to and from the locality where his services may have been required. The fees will be paid by the Society, but the travelling expenses will be a charge against the applicant. This charge may, however, be reduced or remitted altogether at the discretion of the Council, on such step being recommended to them by the Veterinary Committee.

No. 3. The Inspector, on his return from visiting the diseased stock, will report to the Committee, in writing, the results of his observations and proceedings, which Report will be laid before the Council

No. 4. When contingencies arise to prevent a personal discharge of the duties confided to the Inspector, he may, subject to the approval of the Committee, name some competent professional person to act in his stead, who shall receive the same rates of remuneration.

II.—ORDINARY OR OTHER CASES OF DISEASE.

Members may obtain the attendance of the Veterinary Inspector on any case of disease by paying the cost of his visit, which will be at the following rate, viz., 2*l*. 2*s*. per diem, and travelling expenses.

III.—CONSULTATIONS WITHOUT VISIT.

Personal consultation with Veterinary Inspector . .	5*s*.
Consultation by letter	5*s*.
Consultation necessitating the writing of three or more letters.	10*s*.
Post-mortem examination, and report thereon	10*s*.

A return of the number of applications during each half-year being required from the Veterinary Inspector.

IV.—ADMISSION OF DISEASED ANIMALS TO THE VETERINARY COLLEGE; INVESTIGATIONS, LECTURES, AND REPORTS.

No. 1. All Members of the Society have the privilege of sending cattle, sheep, and pigs to the Infirmary of the Royal Veterinary College, on the same terms as if they were Members of the College; viz., by paying for the keep and treatment of cattle 10*s*. 6*d*. per week each animal, and for sheep and pigs "a small proportionate charge to be fixed by the Principal according to circumstances."

No. 2. The College has also undertaken to investigate such particular classes of disease, or special subjects connected with the application of the Veterinary art to cattle, sheep, and pigs, as may be directed by the Council.

No. 3. In addition to the increased number of lectures now given by Professor Simonds—the Lecturer on Cattle Pathology—to the pupils in the Royal Veterinary College, he will also deliver such lectures before the Members of the Society, at their house in Hanover Square, as the Council shall decide.

No. 4. The Royal Veterinary College will from time to time furnish to the Council a detailed Report of the cases of cattle, sheep, and pigs treated in the Infirmary.

Royal Agricultural Society of England.

1862.

President.

LORD PORTMAN.

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Secretary.

H. HALL DARE, 12, *Hanover Square, London,* W.

Consulting-Chemist—Dr. Augustus Voelcker, *Royal Agricultural College, Cirencester.*
Veterinary-Inspector—James Beart Simonds, *Royal Veterinary College,* N.W.
Consulting Engineer—James Easton, or C. E. Amos, *Grove, Southwark,* S.E.
Seedsmen—Thomas Gibbs and Co., *Corner of Halfmoon Street, Piccadilly,* W.
Publisher—John Murray, 50, *Albemarle Street,* W.
Bankers—Messrs. Drummond, *Charing Cross,* S.W.

STANDING COMMITTEES FOR 1862.

Finance Committee.

Hood, Hon. Col. Nelson.
Vernon, Hon. A. H.
Barnett, Charles.
Bramston, T. W., M.P.
Hobbs, Wm. Fisher.
Torr, William.

House Committee.

The President.
Chairman of Finance Committee.
Cavendish, Hon. W. G., M.P.
Hood, Hon. Col. Nelson.
Shelley, Sir J. V., Bt., M.P.
Brandreth, Humphrey.
Challoner, Colonel.
Gibbs, B. T. Brandreth.
Hobbs, Wm. Fisher.

Journal Committee.

Cathcart, Earl.
Portman, Lord.
Speaker, The Rt. Hon. The.
Shelley, Sir J. V., Bt., M.P.
Johnstone, Sir J. V. B., Bt., M.P.
Acland, T. Dyke.
Holland, Ed., M.P.
Hoskyns, C. Wren.
Milward, Richard.
Thompson, H. S., M.P.
Wallis, Owen.

Chemical Committee.

Vernon, Hon. A. H.
Johnstone, Sir J. V. B., Bt., M.P.
Miles, Sir Wm., Bt., M.P.
Acland, T. Dyke.
Daubeny, Dr.
Hoskyns, C. Wren.
Hudson, John.
Humberston, P. S., M.P.
Huxtable, Rev. A.
Lawes, J. B.
Holland, Ed., M.P.
Dent, J. D., M.P.
Thompson, H. S., M.P.

Veterinary Committee.

Shelley, Sir J. V., Bt., M.P.
Johnstone, Sir J. V. B., Bt., M.P.
Miles, Sir Wm., Bt., M.P.
Barker, Thos. Raymond.
Brandreth, Humphrey.
Challoner, Colonel.
Gibbs, B. T. Brandreth.
Hamond, Anthony.
Hobbs, Wm. Fisher.
Pain, Thos.
Simonds, Professor.
Spooner, Professor.
Thompson, H. S., M.P.
Wells, W.

Stock-Prizes Committee.

Walsingham, Lord.
Shelley, Sir J. V., Bt., M.P.
Hood, Hon. Col. Nelson.
Barnett, Charles.
Barthropp, Nathaniel G.
Druce, Joseph.
Gibbs, B. T. Brandreth.
Hobbs, Wm. Fisher.
Holland, Ed., M.P.
Hudson, John.
Jonas, Samuel.
Milward, Richard.
Pain, Thomas.
Pope, Edward.
Randell, Chas.
Rigden, Wm.
Smith, Robert.
Simonds, Professor.
Torr, William.
Towneley, Lieut.-Col.
Turner, George.
Webb, Jonas.

Implement Committee.

CAVENDISH, Hon. W. G., M.P
HOOD, Hon. Col. NELSON
VERNON, Hon A. H.
SHELLEY, Sir J. V., Bt., M.P
MILES, Sir WM., Bt., M.P
AMOS, C. E.
BARNETT, CHARLES.
BRANDRETH, HUMPHREY
CALDWELL, H B.
CANTRELL, CHAS.
CHALLONER, Colonel
EXALL, WILLIAM.
GIBBS, B. T. BRANDRETH.
HAMOND, ANTHONY.
HOBBS, WM. FISHER.
HOSKYNS, C WREN.
SHUTTLEWORTH, JOSEPH.
THOMPSON, H. S., M.P.
TORR, WILLIAM.
WALLIS, OWEN
WILSON, Professor

London Show Committee.

POWIS, Earl of (Chairman).
DOWNSHIRE, Marquis of
FEVERSHAM, Lord.
LEIGH, Lord.
PORTMAN, Lord
TALBOT DE MALAHIDE, Lord.
WALSINGHAM, Lord.
SPEAKER, The Rt. Hon THE.
HAMILTON, Rt Hon. R. C. NISBET, M P
CAVENDISH, Hon. WM G., M P.
HOOD, Hon. Col. NELSON.
VERNON, Hon. A. H
JOHNSTONE, Sir J V B., Bt., M P.
SHELLEY, Sir J. V., Bt., M P.
BARNETT, CHARLES.
BRAMSTON, T. W., M P.
BRANDRETH, HUMPHREY.
CAIRD, J., M P.
CANTRELL, CHAS S.
CHALLONER, Colonel
GIBBS, B. T. BRANDRETH.
HOBBS, WM FISHER.
HOSKYNS, C WREN.
JONAS, SAMUEL.
MILWARD, RICHARD.
PAIN, THOS.
THOMPSON, H. S., M P.
TORR, WILLIAM.

Wool Committee.

POWIS, Earl of
WALSINGHAM, Lord.
HOOD, Hon. Col NELSON.
GIBBS, B T. BRANDRETH
HOBBS, W FISHER.
HOLLAND, EDWARD, M P.
HUDSON, JOHN.
SMITH, ROBERT.
THOMPSON, H. S., M.P.
TORR, WILLIAM
WILSON, Professor.

Foreign Stock Committee.

POWIS, Earl of.
FEVERSHAM, Lord.
CAVENDISH, Hon W. G., M.P.
HOOD, Hon. Col NELSON.
DENT, J. D., M.P.
GIBBS, B T. BRANDRETH.
HOBBS, WM. FISHER.
MILWARD, RICHARD.
TRÉHONNAIS, Mons. DE LA.
WELLS, WM.

⁂ The PRESIDENT, TRUSTEES, and VICE-PRESIDENTS are Members *ex officio* of all Committees.

MEMORANDA.

ADDRESS OF LETTERS.—The Society's office being situated in the postal district designated by the letter W, members, in their correspondence with the Secretary, are requested to subjoin that letter to the usual address.

GENERAL MEETING in London, May 22, 1862, at Twelve o'clock.

MEETING in Battersea Park, London, commencing June 23, 1862.

GENERAL MEETING in London, in December, 1862.

MONTHLY COUNCIL (for transaction of business), at 12 o'clock on the first Wednesday in every month, excepting January, September, and October: open only to Members of Council and Governors of the Society.

WEEKLY COUNCIL (for practical communications), at 12 o'clock on all Wednesdays in February, March, April, May, June, and July, excepting the first Wednesday in each of those months, and during adjournment: open to all Members of the Society, who are particularly invited by the Council to avail themselves of this privilege.

ADJOURNMENTS.—The Council adjourn over Easter, Passion, and Whitsun weeks, when those weeks do not include the first Wednesday of the month, from the first Wednesday in August to the first Wednesday in November; and from the first Wednesday in December to the first Wednesday in February.

DISEASES of Cattle, Sheep, and Pigs.—Members have the privilege of applying to the Veterinary Committee of the Society; and of sending animals to the Royal Veterinary College, on the same terms as if they were subscribers to the College.—(A statement of these privileges will be found in the present Appendix.)

CHEMICAL ANALYSIS.—The privileges of Chemical Analysis enjoyed by Members of the Society will be found stated in the Appendix of the present volume.

LOCAL CHEQUES.—Members are particularly requested not to forward Country Cheques for payment in London; but London Cheques, or Post-office Orders on Vere-street (payable to H. HALL DARE), in lieu of them. All Cheques are required to bear upon them a penny draft or receipt stamp, which must be cancelled in each case by the initials of the drawer. They may also conveniently transmit their Subscriptions to the Society, by requesting their Country Bankers to pay (through their London Agents) the amount at the Society's Office (No. 12, Hanover Square, London), between the hours of ten and four, when official receipts, signed by the Secretary, will be given for such payments.

NEW MEMBERS.—Every candidate for admission into the Society must be proposed by a Member; the proposer to specify in writing the full name, usual place of residence, and post-town, of the candidate, either at a Council meeting or by letter addressed to the Secretary.

PACKETS BY POST.—Packets not exceeding two feet in length, width, or depth, consisting of written or printed matter (but not containing letters sealed or open), if sent without envelopes, or enclosed in envelopes open at each end, may be forwarded by the inland post, if stamped, at the following rates:—

For a packet not exceeding	4 ounces	(or quarter of a pound) . . .	1 penny
,, ,, ,,	8 ,,	(or half a pound)	2 pence.
,, ,, ,,	16 ,,	(or one pound)	4 ,,
,, ,, ,,	24 ,,	(or one pound and a half) . .	6 ,,
,, ,, ,,	32 ,,	(or two pounds)	8 ,,

[And so on in the proportion of 8 ounces for each additional 2*d.*]

⁂ Members may obtain on application to the Secretary copies of an Abstract of the Charter and Bye-Laws, of a Statement of the General Objects, &c., of the Society, of Chemical and Veterinary Privileges, and of other printed papers connected with special departments of the Society's business

Royal Agricultural Society of England.

GENERAL MEETING,

12, HANOVER SQUARE, WEDNESDAY, DECEMBER 11, 1861.

REPORT OF THE COUNCIL.

SINCE the last General Meeting in May, 3 Governors and 28 Members have died; the names of 53 Members have been removed from the list on retirement or otherwise, and 163 new Members have been elected; so that the Society now consists of—

84	Life Governors,
95	Annual Governors,
1121	Life Members,
3399	Annual Members, and
17	Honorary Members,

making a total of 4719 names on the list of the Society at the present time; being an increase of 86 since the date of the last Report.

The Council have appointed the Right Hon. the Earl of Powis a Trustee of the Society in the place of the late Right Hon. Sir James Graham, Bart.; and have elected Mr. W. William Wells, of Redleaf; Mr. Charles Randell, of Evesham; and the Hon. Colonel W. Cotton, of Malpas, General Members of the Council, to supply the vacancies created by the resignation of the Earls of Romney and Macclesfield, and the Hon. Colonel Douglas Pennant, M.P.

The half-yearly statement of accounts to the 30th June, 1861, has been examined and approved by the Auditors and Accountants of the Society. The finances were never in a more satisfactory condition than at present, the sum of 3000*l.* having been lately added to the funded capital of the Society, which now amounts to 17,488*l.* 17*s.* 10*d.* stock in the New Three per

Cents.—a sum now fully representing the amount of compositions which have been received from Governors and Members in lieu of their annual subscriptions.

The collection of the arrears of subscription has been steadily progressing under the Finance Committee; the amount now due, inclusive of those in arrear for the current year, being 580*l.*; and the Council hope that the new privileges accorded to the Members will have the effect of inducing a more punctual payment in future.

A Special Committee has been appointed to consider the question of the admission of short-hand writers or reporters from the press to the Weekly Meetings of the Council, and it has been determined that one reporter from each of the three Agricultural Papers, viz., 'The Mark Lane Express,' 'Bell's Weekly Messenger,' and the 'Agricultural Gazette,' and one from the London daily papers, shall be allowed to attend. Additional publicity will thus be given to Papers read before the Council.

The sanguine expectations entertained by the Council as to the success of the Leeds Meeting were fully realised. On no former occasion had the Society's Show Yard presented such a thronged appearance as on the two days of entrance at 1*s.*, when 73,824 and 40,368 persons respectively paid for admission. The total number of visitors, exclusive of many members of the Society who for the first time exercised the privilege of free admission, was 145,329; amongst whom must be reckoned many of the mechanics of the town and neighbourhood, who viewed with intelligent interest the enormous collection of newly invented implements and magnificent stock submitted for their inspection. The interest of the Show Yard was greatly increased by the enclosure of a space for exercising the horses, which were thus seen to the greatest advantage. The Mayor, assisted by a local Committee, carried out all the arrangements in a very liberal spirit, and entertained the Members of the Society at a conversazione in the magnificent Town Hall of Leeds.

The Council regret their inability to lay before the General Meeting a Report upon the Steam-Ploughing at Leeds, a complete Report from the Judges in that department not having been received.

The First Commissioner of Works has granted the free use of a portion of Battersea Park for the purposes of the Metropolitan

Meeting, and it is confidently anticipated that the large number of visitors to London during the ensuing year will ensure a numerous attendance in the Society's Show Yard. The Council have fixed that the Meeting shall take place in the week commencing Monday, the 23rd of June next, and have determined that there shall be an Exhibition of Implements, but that the trials for fixed and portable Steam-engines, fixed and portable Finishing-machines, Hand-dressing Machines, and Barley-hummellers, being the last of the Quadrennial Series, shall be postponed till the following year.

It has been determined to add to the Prize-sheet classes for Longhorned, Norfolk and Suffolk Polled, North and South Wales, Kerry, and Alderney and Channel Islands Cattle; and in Horses, classes for Suffolk, Carriage and Roadster Horses; in Sheep, classes for Lincolns, Cotswolds, Hampshire Downs, and West Country, Dorset, Oxfordshire Downs, Romney Marsh, and Mountain and Irish Long-woolled; and in Pigs, a class for the Berkshire breed; amounting in the whole to 3570*l.* The Highland and Agricultural Society of Scotland have offered prizes for Scottish Stock amounting to 597*l.* A list of prizes for Foreign Stock, amounting to 750*l.*, will be transmitted to foreign countries through Her Majesty's Secretary of State for Foreign Affairs.

A Special Committee has been appointed to confer with the Governors of the Royal Veterinary College, in order that the veterinary privileges of Members of this Society may be placed on a more satisfactory footing.

In accordance with the Charter of the Society, it is necessary to hold a Country Meeting of the Members in every year. The Council have, therefore, determined that the same shall be held for 1862 (*pro formâ*) in the town of Windsor. The district for the Society's Country Meeting for 1863 will be that comprising South Wales and Herefordshire, Monmouthshire, and Worcestershire.

An interesting paper on British Wool has been read to the Society by Mr. Caird, M.P.; and, in order to give to the numerous foreigners who may be expected to visit the Metropolis during the ensuing year an opportunity of inspecting samples of the wool of our native breeds and crosses, the Council have resolved to exhibit this product in the International Exhibition of 1862; for which purpose space has been granted by the Royal

Commissioners; and numerous promises of support have already been received from members of the Society and others, engaged in this branch of animal products, towards carrying out its due representation.

Mr. Chadwick, C.B., has also read a Paper on the Half-time Principle of Instruction to Children engaged in Agriculture.

The schedule of prizes offered for Essays and Reports, to be sent in to the Secretary, by the 1st of March next, is as follows:—

I. AGRICULTURE OF STAFFORDSHIRE.

Fifty Sovereigns will be given for the best Report on the Agriculture of Staffordshire.

The principal geological and physical features of the county should be described, the nature of the Soil and character of the Farming in its different districts or natural divisions; its Live Stock; Implements; recent changes of Farm Management; Improvements lately introduced and still required; remarkable or characteristic Farms; the influence exercised by neighbouring mines and factories on the cropping of the soil, the value of land, the rates of prices and wages, and on the demand for timber, and consequently on the profitable management of woods and plantations.

II. SUBSOILING VERSUS DOUBLE-PLOUGHING.

Twenty Sovereigns will be given for the best Essay on the Comparative Merits of Subsoiling, Trenching, and Double-ploughing.

The comparative cost of these several modes of cultivation; their influence on different crops, on the germination of seed-weeds, and the destruction of root-weeds; the supplies of manure required in each case are to be contrasted, and the most seasonable manner of conducting the work described.

III. STEAM POWER AND THRESHING-MACHINES.

Twenty Sovereigns will be given for the best Essay on the Comparative Advantages of Fixed or Moveable Steam-Power, and of the Single and Double-dressing Threshing-machine.

The cost of repairs and allowance required for depreciation in each case are to be carefully examined; the labour and waste incidental to threshing in the field and in the barn; and the applicability of the steam-power to other purposes should be contrasted: in the case of the threshing-machines, the weight of the machine and the requirements of the market in respect of samples should be considered.

IV. HAYMAKING.

Ten Sovereigns will be given for the best Essay on Recent Improvements in Haymaking.

V.

Ten Sovereigns will be given for the best Essay on any other Agricultural Subject;

And an additional list has been approved, papers for which competition are to be sent in by the 1st of May.

1. Thirty Sovereigns will be given for the best Essay on the Parasites, including Entozoa, which infest cattle and sheep.
2. Twenty Sovereigns will be given for the best Essay on Land Valuing.

   The estimates which ought to form the basis of calculation in fixing the rental of land; the seasons most favourable for inspection; the practicability of reducing lands under different systems of culture to the same standard of calculation, should be discussed.

3. Ten Sovereigns will be given for the best Essay on the Management of a Home Farm, or Farm attached to the residence of a Landed Proprietor. The arrangements in the dairy and stable, the proper rates of charge for farm produce or services supplied, and the advantages and drawbacks of such a connection are to be discussed.
4. Ten Sovereigns will be given for the best Essay on the Ravages of Grub and Slug on the Wheat-plant.

   The predisposing causes from weather, or situation, or cropping, and the best modes of prevention or cure are to be stated.

Contributors of Papers are requested to retain copies of their communications, as the Society cannot be responsible for their return.

The successful competitor for the Prize of 50*l.*, offered by the Right Hon. the Earl of Powis, for the best Essay on the Improvement in the Farming of Yorkshire, since the date of last Reports in the Journal, was Mr. W. Wright, of Sigglesthorne Hall, Holderness.

The Society's Prizes have been awarded as follows:—

CLASS II. To the Rev. J. Wilkinson, Broughton Gifford Rectory, for the best report on the Agriculture of Hampshire	£50
CLASS VI. To Mr. Thomas Bowick, Stoneleigh Abbey Farm, Warwickshire, for the best Essay on the Rearing of Calves	£10
CLASS VII. To Mr. Peter Love, of Northampton, for the best Essay on Harvesting Corn	£10
CLASS VIII. To the late Mr. Charles Wratislaw, of Woolscott, Rugby, for the best Essay on Farm Capital	£10

By order of the Council,

H. HALL DARE, Secretary.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

HALF-YEARLY CASH ACCOUNT, FROM 1ST JANUARY TO 30TH JUNE, 1861.

DR.

	£.	s.	d.	£.	s.	d.	£.	s.	d.
To Balance in hand, 1st Jan., 1861:—									
Bankers				1,236	19	2			
Secretary				41	13	4	1,278	12	6
To Income, viz.:—									
Dividend on Stock				172	10	0			
Subscriptions:—	£.	s.	d.						
Governors' Life-Composition	50	0	0						
Governors' Annual	435	0	0						
Members' Life-Compositions	220	0	0						
Members' Annual	3,006	8	0	3,711	8	0			
Journal:—									
Advertisements				28	3	0	3,912	1	0
To Country Meetings:—									
Canterbury				9	5	0			
Leeds				2,899	3	0	2,908	8	0
							£8,099	1	6

(Signed) W. FISHER HOBBS, *for Finance Committee.*
QUILTER, BALL, JAY, & Co., *Accountants.*

CR.

	£.	s.	d.	£	s.	d.	£.	s.	d.
By Expenditure:—									
Establishment—									
Official Salaries and Wages	327	6	0						
House Expenses, Rent, Taxes, &c.	320	18	7	618	4	7			
Journal:—									
Printing	455	3	6						
Stitching	60	14	3						
Delivery, Advertising, &c.	117	11	0						
Prize Essay	10	0	0						
Other Contributions	26	15	0						
Editor's Salary	250	0	0	920	3	9			
Chemical:—									
Consulting Chemist's Salary (3 quarters)	225	0	0						
Grant for Investigations (1 year)	200	0	0						
Special Grant for Cheese Investigations	100	0	0	525	0	0			
Veterinary:—									
Grant to Royal Veterinary College	100	0	0						
Investigations and Experiments	33	4	6	133	4	6			
Postage and Carriage				30	4	11			
Advertisements				10	6	0			
Sundries				10	18	7			
Subscriptions returned (paid in error)				3	1	0	2,281	3	4
By Investment—									
Purchase of Stock, New 3 per Cents.				..	..		2,001	1	6
By Country Meetings—									
Canterbury				35	11	0			
Leeds				1,542	8	10	1,577	19	10
Total Expenditure				..	..		5,860	4	8
By Balance in hand:—									
Bankers				2,229	13	8			
Secretary				9	3	2	2,238	16	10
							£8,099	1	6

Examined, audited, and found correct, this 6th day of December, 1861.

(Signed) WILLIAM ASTBURY,
HENRY CORBET,
WILLIAM COHEN, } *Auditors on the part of the Society.*

BALANCE-SHEET, 30TH JUNE, 1861.

LIABILITIES.	£.	s.	d.	£.	s.	d.	£.	s.	d.
To Capital:—									
Surplus, 31st Dec., 1860				15,043	18	2			
Surplus of Income over the Expenditure during the Half-year, viz:—	£.	s.	d.						
Income	3,912	1	0						
Expenditure	2,281	3	4	1,630	17	8	16,674	15	10
To Balance at Credit of Leeds Meeting				..	..		1,355	12	1
To Canterbury Meeting Balance outstanding				..	..		6	5	0
							£18,036	12	11

ASSETS.	£.	s.	d.	£.	s.	d.
By Cash in hand	.	.		2,238	16	10
By New 3 per cent. Stock 14,219*l.* 2*s.* 9*d.* cost				13,797	16	1
By Books and Furniture, Society's House, Hanover Square				2,000	0	0
				£18,036	12	11

COUNTRY-MEETING ACCOUNT: LEEDS, 1861.

RECEIPTS.

	£.	s.	d.
Subscription from Leeds	1,500	0	0
Admissions to the Show Yard	9,886	12	7
Sale of Catalogues.	691	3	0
Implement Exhibitors' Payment for Shedding	907	19	0
Non-Members Fees for entry of Implements	56	5	0
Fees for entry of Live-Stock	413	0	0
" " Flax, Butter, Cheese, and Wool	4	10	0
Fines for non-Exhibition of Live-Stock	32	0	0
" " " Implements	9	5	0
Extra lines in Implement Catalogues	10	12	0
Special Prizes offered by Lord Londesborough	30	0	0
	£13,541	6	7

EXPENDITURE.

	£.	s.	d.
Show and Trial Yards, hire of Hurdles and Turnstiles	3,303	13	4
Judges of Implements, 206*l*; Stock, 280*l*; Flax, Cheese, Butter, and Wool, 24*l*.	510	0	0
Consulting-Engineer and Assistants	152	5	7
Veterinary-Inspectors and Assistants	60	0	0
Lodgings for Judges, Engineer, Veterinary-Inspectors, &c	70	8	0
Refreshments for ditto	81	2	6
Metropolitan Police, 143*l* 6*s*; Local Constabulary, 22*l* 14*s*. 2*d*.	166	0	2
Extra Clerks and Assistants Secretary 12*l* 18*s* 6*d*., Director, 75*l*. 10*s*.; Bankers' Clerks, 31*l*.	119	8	6
Assistant Steward, 53*l*. 11*s*.; Foremen of Departments, 41*l*. 10*s*.	95	1	0
Index-Clerk and Money-takers, 63*l*; Door-keepers, Money-changers, &c, 36*l*. 15*s*.	99	15	0
Yardmen Watchmen, Fieldmen, and Grooms	189	15	0
Catalogues, &c, Stock, 114*l*. 7*s* 3*d*; Implements, 404*l* 16*s* 4*d*; Awards—Stock, 28*l*. 4*s*.; Implements, 18*l*. 7*s* 2*d*, Sellers of, 27*l* 16*s* 6*d*.; Packing-cases for, 13*l* 16*s* 5*d*.	607	7	8
Printing Prize-sheets, 40*l* 15*s*; Certificates, Railway Papers, Admission Orders, Parchment Labels, Tickets, Circulars, Programmes, &c, 134*l* 3*s*. 1*d*.	174	18	1
Advertising	181	19	7
Postage and Stationery Director, 23*l* 5*s*; Secretary, 28*l*. 19*s* 11*d*.	52	4	11
Badges for Members of Council, Stewards, Judges, &c	9	15	3
Dinner-tickets to guests, 5*l*; Toast Lists, &c, 2*l* 10*s*	7	10	0
Hay, 202*l* 11*s* 1*d*, Straw, 211*l*. 10*s*; Clover, 86*l* 2*s*; Tares, 149*l* 7*s* 8*d*.	649	10	9
Coals, Ashes, &c.	15	18	10
Surveying, 14*l*, Scavenging, 22*l* 10*s*; Water-carts and Horses, 20*l*. 14*s*.	57	4	0
Compensation for damage to Crops at Trial of Reapers	30	0	0
Hire of Horses, 18*l* 18*s*; and Conveyance of Judges at ditto, 5*l* 5*s*	24	3	0
Boxes for Director, 4*l*. 18*s*., Hire of Steam-Engine, 1*l*; Hire of Weighing-Machine, 10*s* 6*d*; Twine, 3*l* 1*s* 11*d*; Pipes and Cocks, 2*l* 5*s*	11	15	5
Seeds, and Turnip-Measure for Trials	6	10	8
Carriage of Implements to Trial-Fields, 21*l*. 8*s* 6*d*, Carriage of Dynamometer 1*l* 12*s* 10*d*	23	1	4
Entrance Payments made in error returned	3	2	6
Official Staff Board and Travelling Expenses	14	15	2
Petty Payments	7	13	2
Lord Londesborough's Prizes	30	0	0
Prizes awarded and paid Implements, 469*l*; Live-Stock, 1,830*l*.; Medals, 17*l* 6*s* 6*d*.	2,316	6	6
Total Expenditure	9,071	5	11
Excess of Receipts over Payments	4,470	0	8
	£13,541	6	7

METROPOLITAN SHOW,

TO BE HELD IN

BATTERSEA PARK.

COMMENCING MONDAY, THE 23RD OF JUNE, 1862.

Members of the Royal Agricultural Society of England, and of the Highland and Agricultural Society of Scotland, have the privilege of making Entries on the payment of Five Shillings on each Certificate of Cattle, Horses, Sheep, and Pigs; but Non-Members will be allowed to compete on the payment of Fifteen Shillings on each Certificate.

Forms of Certificates may be obtained on application to the Secretary, at the Office of the Society, No. 12, Hanover Square, London (W.). All Certificates for the entry of Live-Stock must be returned, filled up, to the Secretary, on or before the 1st of May.

All Prizes of the Royal Agricultural Society of England, and all the Prizes offered by the Highland and Agricultural Society of Scotland, are open to General Competition.

All Ages calculated to July 1, 1862.

PRIZES.

TO THE OWNERS OF THE FOLLOWING:—

Reference Number in Certificates	CATTLE.	1st Prize.	2nd Prize.	3rd Prize.
	SHORT-HORNED.			
	Class	£.	£.	£.
1	1.—Bull, calved on or before the 1st of July, 1859, above three and under six years old	30	15	5
2	2.—Bull, calved *since* the 1st of July, 1859, above two and under three years old	30	15	5
3	3.—Bull, calved *since* the 1st of July, 1860, above one and under two years old	25	15	5
4	4.—Bull-Calf, above six and under twelve months old	15	10	5
5	5.—Cow, above three years old	20	10	5
6	6.—Heifer, in-milk or in-calf, under three years old	15	10	5
7	7.—Yearling Heifer	15	10	5
8	8.—Heifer-Calf, above six and under twelve months old	15	10	5
	To the Owner of the best *Male* Animal in the Short-horned Classes	GOLD MEDAL.		
	To the Owner of the best *Female* Animal in the Short-horned Classes	GOLD MEDAL.		

Reference Number in Certificates	CATTLE—*continued.*	1st Prize.	2nd Prize.	3rd Prize.
	HEREFORD.			
	Class	£.	£.	£.
9	1.—Bull, calved on or before the 1st of July, 1859, above three and under six years old	30	15	5
10	2.—Bull, calved *since* the 1st of July, 1859, above two and under three years old	30	15	5
11	3.—Bull, calved *since* the 1st of July, 1860, above one and under two years old	25	15	5
12	4.—Bull-Calf, above six and under twelve months old	15	10	5
13	5.—Cow, above three years old	20	10	5
14	6.—Heifer, in-milk or in-calf, under three years old	15	10	5
15	7.—Yearling Heifer	15	10	5
16	8.—Heifer-Calf, above six and under twelve months old	15	10	5
	To the Owner of the best *Male* Animal in the Hereford Classes	GOLD MEDAL.		
	To the Owner of the best *Female* Animal in the Hereford Classes	GOLD MEDAL.		
	DEVON.			
17	1.—Bull, calved on or before the 1st of July, 1859, above three and under six years old	30	15	5
18	2.—Bull, calved *since* the 1st of July, 1859, above two and under three years old	30	15	5
19	3.—Bull, calved *since* the 1st of July, 1860, above one and under two years old . . .	25	15	5
20	4.—Bull-Calf, above six and under twelve months old	15	10	5
21	5.—Cow, above three years old	20	10	5
22	6.—Heifer, in-milk or in-calf, under three years old	15	10	5
23	7.—Yearling Heifer	15	10	5
24	8.—Heifer-Calf, above six and under twelve months old	15	10	5
	To the Owner of the best *Male* Animal in the Devon Classes	GOLD MEDAL		
	To the Owner of the best *Female* Animal in the Devon Classes	GOLD MEDAL		
	SUSSEX.			
25	1.—Bull, calved on or before the 1st of July, 1859, under six years old	15	5	..
26	2.—Bull, calved *since* the 1st of July, 1859, and more than one year old	10	5	..
27	3.—Cow, above three years old	10	5	
28	4.—Heifer, in-milk or in-calf, under three years old	10	5	.
29	5.—Yearling Heifer	10	5	.

Reference Number in Certificates	CATTLE—*continued.*	1st Prize	2nd Prize.	3rd Prize.
	LONG-HORNED.			
	Class	£.	£.	£.
30	1.—Bull, calved on or before the 1st of July, 1859, under six years old	15	5	..
31	2.—Bull, calved *since* the 1st of July, 1859, and more than one year old	10	5	.
32	3.—Cow, above three years old	10	5	..
33	4.—Heifer, in-milk or in-calf, under three years old	10	5	..
34	5.—Yearling Heifer	10	5	..
	NORFOLK AND SUFFOLK POLLED.			
35	1.—Bull, calved on or before the 1st of July, 1859, under six years old	15	5	..
36	2.—Bull, called *since* the 1st of July, 1859, and more than one year old	10	5	..
37	3.—Cow, above three years old	10	5	..
38	4.—Heifer, in-milk or in-calf, under three years old	10	5	..
39	5.—Yearling Heifer	10	5	..
	NORTH WALES.			
40	1.—Bull, calved on or before the 1st of July, 1859, under six years old	15	5	..
41	2.—Bull, calved *since* the 1st of July, 1859, and more than one year old	10	5	.
42	3.—Cow, above three years old	10	5	.
43	4.—Heifer, in-milk or in-calf, under three years old	10	5	..
44	5.—Yearling Heifer	10	5	..
	SOUTH WALES.			
45	1.—Bull, calved on or before the 1st of July, 1859, under six years old	15	5	..
46	2.—Bull, calved *since* the 1st of July, 1859, and more than one year old	10	5	.
47	3.—Cow, above three years old	10	5	..
48	4.—Heifer, in-milk or in-calf, under three years old	10	5	
49	5.—Yearling Heifer	10	5	..
	IRISH—KERRY.			
50	1.—Bull, calved on or before the 1st of July, 1859, under six years old	15	5	..
51	2.—Bull, calved *since* the 1st of July, 1859, and more than one year old	10	5	..
52	3.—Cow, above three years old	10	5	..
53	4.—Heifer, in-milk or in-calf, under three years old	10	5	..
54	5.—Yearling Heifer	10	5	..

Reference Number in Certificates	CATTLE—*continued.* CHANNEL ISLANDS:—	1st Prize	2nd Prize.	3rd Prize.
	JERSEY, commonly called ALDERNEY.			
	Class	£.	£.	£.
55	1.—Bull, calved on or before the 1st of July, 1859, under four years old	10	..	..
56	2.—Bull, calved *since* the 1st of July, 1859, and more than one year old	5	..	..
57	3.—Cow, above three years old	10	6	4
58	4.—Heifer, in-milk or in-calf, under three years old	10	5	..
	GUERNSEY.			
59	1.—Bull, calved on or before the 1st of July, 1859, under four years old	10	..	..
60	2.—Bull, calved *since* the 1st of July, 1859, and more than one year old	5	..	..
61	3.—Cow, above three years old	10	6	4
62	4.—Heifer, in-milk or in-calf, under three years old	10	5	..
	HORSES.			
63	For the Thorough-bred Stud Horse, having served Mares during the season 1862, which, in the opinion of the Judges, is best calculated to *improve and perpetuate* the breed of the sound and stout Thorough-bred Horse for General Stud Purposes ..	100	25	..
	HUNTER.			
64	1.—Stallion, thorough or half bred	30	15	..
65	2.—Brood Mare, with foal at foot, or in-foal ..	20	10	..
66	3.—Gelding, four or five years old	20	10	..
67	4.—Mare, four or five years old	20	10	..
	CARRIAGE.			
68	1.—Stallion	20	10	..
69	2.—Brood Mare, with foal at foot, or in-foal ..	20	10	..
	ROADSTER.			
70	1.—Stallion	20	10	..
71	2.—Brood Mare, with foal at foot, or in-foal ..	20	10	..

Reference Number in Certificates	AGRICULTURAL HORSES.	1st Prize	2nd Prize	3rd Prize.
	SUFFOLK.			
	Class	£.	£.	£.
72	1.—Stallion, foaled on or before the 1st of January, 1860	30	15	..
73	2.—Stallion, foaled in the year 1860	20	10	..
74	3.—Mare and Foal	20	10	..
75	4.—Two years old Filly	15	10	..
	AGRICULTURAL.			
	Not qualified to compete as Suffolk.			
76	1.—Stallion, foaled on or before the 1st of January, 1860	30	15	..
77	2.—Stallion, foaled in the year 1860	20	10	.
78	3.—Mare and Foal	20	10	..
79	4.—Two years old Filly	15	10	..
	DRAY.			
80	1.—Stallion, foaled on or before the 1st of January, 1860	30	15	..
81	2.—Stallion, foaled in the year 1860	20	10	..
82	3.—Mare and Foal	20	10	.
83	4.—Filly, foaled in the year 1860	15	10	..
	PONIES.			
	Above 12½ *and under* 14 *hands.*			
84	1.—Stallion	15	5	..
85	2.—Mare	10	5	..
86	3.—Gelding, four or five years old	10	..	..
	Not exceeding 12½ *hands.*			
87	1.—Stallion	15	5	..
88	2.—Mare	10	5	
89	3.—Gelding, four or five years old	10	..	..
	SHEEP.			
	LEICESTER.			
90	1.—Shearling Ram	20	10	5
91	2.—Ram of any other age	20	10	5
92	3.—Pen of Five Shearling Ewes, of the same flock	20	10	5
	To the Owner of the best Ram in the Leicester Classes	GOLD MEDAL.		
	LINCOLN.			
93	1.—Shearling Ram	15	10	5
94	2.—Ram of any other age	15	10	5
25	3.—Pen of Five Shearling Ewes, of the same flock	15	10	5

Reference Number in Certificates	SHEEP—*continued.*	1st Prize	2nd Prize.	3rd Prize.
	COTSWOLD.			
	Class	£.	£.	£.
96	1.—Shearling Ram	15	10	5
97	2.—Ram of any other age	15	10	5
98	3.—Pen of Five Shearling Ewes, of the same flock	15	10	5
	KENTISH OR ROMNEY MARSH.			
99	1.—Shearling Ram	15	10	5
100	2.—Ram of any other age	15	10	5
101	3.—Pen of Five Shearling Ewes, of the same flock	15	10	5
	LONG-WOOLLED.			
	Not qualified to compete as Leicesters, Lincolns, Cotswolds, or Kentish.			
102	1.—Shearling Ram	15	10	5
103	2.—Ram of any other age . .	15	10	5
104	3.—Pen of Five Shearling Ewes, of the same flock	15	10	5
	IRISH—PURE NATIVE LONG-WOOLLED BREEDS.			
105	1.—Shearling Ram	15	10	5
106	2.—Ram of any other age	15	10	5
107	3.—Pen of Five Shearling Ewes, of the same flock	15	10	5
	SOUTHDOWN.			
108	1.—Shearling Ram	20	10	5
109	2.—Ram of any other age	20	10	5
110	3.—Pen of Five Shearling Ewes, of the same flock	20	10	5
	To the Owner of the best Ram in the Southdown Classes	GOLD MEDAL.		
	SHROPSHIRE.			
111	1.—Shearling Ram	15	10	5
112	2.—Ram of any other age	15	10	5
113	3.—Pen of Five Shearling Ewes, of the same flock	15	10	5
	HAMPSHIRE AND WEST COUNTRY DOWN.			
114	1.—Shearling Ram	15	10	5
115	2.—Ram of any other age	15	10	5
116	3.—Pen of Five Shearling Ewes, of the same flock	15	10	5
	OXFORDSHIRE DOWN.			
117	1.—Shearling Ram	15	10	5
118	2.—Ram of any other age	15	10	5
119	3.—Pen of Five Shearling Ewes, of the same flock	15	10	5

Reference Number in Certificates	SHEEP—*continued.*	1st Prize	2nd Prize.	3rd Prize.
	DORSET.			
	Class	£.	£,	£.
120	1.--Shearling Ram	15	10	5
121	2.—Ram of any other age	15	10	5
122	3.—Pen of Five Shearling Ewes, of the same flock	15	10	5
	MOUNTAIN.			
123	1.—Shearling Ram	15	10	5
124	2.—Ram of any other age	15	10	5
125	3.—Pen of Five Shearling Ewes, of the same flock	15	10	5
	PIGS.			
126	1.—Boar of a large breed, of any colour	10	5	..
127	2 —Boar of a small white breed	10	5	..
128	3.—Boar of a small black breed	10	5	..
129	4.—Boar of the Berkshire breed . .	10	5	..
130	5.—Boar of a breed not eligible for the preceding classes	10	5	..
131	6.—Breeding Sow of a large breed, of any colour	10	5	..
132	7.—Breeding Sow of a small white breed .	10	5	.
133	8 —Breeding Sow of a small black breed ..	10	5	..
134	9.—Breeding Sow of the Berkshire breed ..	10	5	..
135	10.—Breeding Sow of a breed not eligible for the preceding classes	10	5	..
136	11.—Pen of Three Breeding Sow Pigs of a large breed, of any colour, of the same litter, above four and under eight months old	10	5	.
137	12.—Pen of Three Breeding Sow Pigs of a small white breed, of the same litter, above four and under eight months old	10	5	..
138	13.—Pen of Three Breeding Sow Pigs of a small black breed, of the same litter, above four and under eight months old	10	5	
139	14.—Pen of Three Breeding Sow Pigs of the Berkshire breed, of the same litter, above four and under eight months old	10	5	..
140	15.—Pen of Three Breeding Sow Pigs of a breed not eligible for the preceding classes, of the same litter, above four and under eight months old	10	5	..

PRIZES

OFFERED BY THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

Reference Number in Certificates	CATTLE.	1st Prize.	2nd Prize.	3rd Prize.
	POLLED (ABERDEEN AND ANGUS).	£.	£.	
	Class			
141	1.—Bull, calved before the 1st of January, 1860	20	10	Silver Medal.
142	2.—Bull, calved after the 1st of January, 1860	20	10	Ditto.
143	3.—Bull, calved after the 1st of January, 1861	10	5	Ditto.
144	4.—Cow, of any age	10	5	Ditto
145	5.—Heifer, calved after the 1st of January, 1860	10	5	Ditto.
146	6.—Heifer, calved after the 1st of January, 1861	8	4	Ditto.
	POLLED (GALLOWAY).			
147	1.—Bull, calved before the 1st of January, 1860	20	10	Ditto.
148	2.—Bull, calved after the 1st of January, 1860	20	10	Ditto.
149	3.—Bull, calved after the 1st of January, 1861	10	5	Ditto.
150	4.—Cow, of any age	10	5	Ditto
151	5.—Heifer, calved after the 1st of January, 1860	10	5	Ditto.
152	6.—Heifer, calved after the 1st of January, 1861	8	4	Ditto.
	HIGHLAND.			
153	1.—Bull, calved before the 1st of January, 1859	20	10	Ditto.
154	2.—Bull, calved after the 1st of January, 1859	20	10	Ditto.
155	3.—Bull, calved after the 1st of January, 1860	10	5	Ditto.
156	4.—Cow, of any age	10	5	Ditto.
157	5.—Heifer, calved after the 1st of January, 1859	10	5	Ditto.
158	6.—Heifer, calved after the 1st of January, 1860	8	4	Ditto.
	AYRSHIRE.			
159	1.—Bull. calved before the 1st of January, 1860	20	10	Ditto.
160	2.—Bull, calved after the 1st of January, 1860	20	10	Ditto
161	3.—Bull, calved after the 1st of January, 1861	10	5	Ditto
162	4.—Cow, in-milk, of any age	10	5	Ditto.
163	5.—Cow, in-calf, of any age	10	5	Ditto.
164	6.—Heifer, calved after the 1st of January, 1860	10	5	Ditto
165	7.—Heifer, calved after the 1st of January, 1861	8	4	Ditto
	HORSES.			
	CLYDESDALE.			
166	1.—Stallion, foaled before the 1st of January, 1859	30	15	Ditto
167	2.—Entire Colt, foaled after the 1st of January, 1859	20	10	Ditto
168	3.—Mare (with foal at foot), foaled before the 1st of January, 1859	20	10	Ditto
169	4.—Mare (in-foal), foaled before the 1st of January, 1859	16	8	Ditto
170	5.—Filly, foaled after the 1st of January, 1859	10	5	Ditto

Essays and Reports.—PRIZES FOR 1862.—Supplementary List, open to general competition. Papers to be sent in on or before the 1st of May.

VI. PARASITES.

THIRTY SOVEREIGNS will be given for the best Essay on the Parasites, including Entozoa, which infest cattle and sheep.

VII. LAND-VALUING.

TWENTY SOVEREIGNS will be given for the best Essay on Land-Valuing.

The estimates which ought to form the basis of calculation in fixing the rental of land; the seasons most favourable for inspection; the practicability of reducing lands under different systems of culture to the same standard of calculation, should be discussed.

VIII. MANAGEMENT OF HOME FARM.

TEN SOVEREIGNS will be given for the best Essay on the Management of a Home Farm, or Farm attached to the residence of a Landed Proprietor. The arrangements in the dairy and stable, the proper rates of charge for farm produce or services supplied, and the advantages and drawbacks of such a connexion are to be discussed.

IX. GRUB AND SLUG IN WHEAT.

TEN SOVEREIGNS will be given for the best Essay on the Ravages of Grub and Slug on the Wheat-plant.

The predisposing causes from weather, or situation, or cropping, and the best modes of prevention or cure, are to be stated.

Reports or Essays competing for the Prizes must be sent to the Secretary of the Society, at 12, *Hanover Square, London, on or before May* 1, 1862. *Contributors of Papers are requested to retain Copies of their Communications, as the Society cannot be responsible for their return.*

RULES, &c.

RULES OF COMPETITION FOR PRIZE ESSAYS.

1. All information contained in Prize Essays shall be founded on experience or observation, and not on simple reference to books or other sources. Competitors are requested to use foolscap or large letter paper, and not to write on both sides of the leaf.

2. Drawings, specimens, or models, drawn or constructed to a stated scale, shall accompany writings requiring them.

3. All competitors shall enclose their names and addresses in a sealed cover, on which only their motto, the subject of their Essay, and the number of that subject in the Prize List of the Society, shall be written.*

4. The President or Chairman of the Council for the time being shall open the cover on which the motto designating the Essay to which the Prize has been awarded is written, and shall declare the name of the author.

5. The Chairman of the Journal Committee shall alone be empowered to open the motto-paper of any Essay not obtaining the Prize, that he may think likely to be useful for the Society's objects; with a view of consulting the writer confidentially as to his willingness to place such Essay at the disposal of the Journal Committee.

6. The copyright of all Essays gaining Prizes shall belong to the Society, who shall accordingly have the power to publish the whole or any part of such Essays; and the other Essays will be returned on the application of the writers; but the Society do not make themselves responsible for their loss.

7. The Society are not bound to award a prize unless they consider one of the Essays deserving of it.

8. In all reports of experiments the expenses shall be accurately detailed.

9. The imperial weights and measures only are those by which calculations are to be made.

10. No prize shall be given for any Essay which has been already in print.

11. Prizes may be taken in money or plate, at the option of the successful candidate.

12. All Essays must be addressed to the Secretary, at the house of the Society.

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* Competitors are requested to write their motto on the enclosed paper on which their names are written, as well as on the outside of the envelope.

Members' Privileges of Chemical Analysis.

The Council have fixed the following rates of Charge for Analyses to be made by the Consulting Chemist for the *bonâ-fide* use of Members of the Society; who (to avoid all unnecessary correspondence) are particularly requested, when applying to him, to mention the kind of analysis they require, and to quote its number in the subjoined schedule. The charge for analysis, together with the carriage of the specimens, must be paid to him by members at the time of their application.

No. 1.	An opinion of the genuineness of Peruvian guano, bone-dust, or oil-cake (each sample)	5*s*.
„ 2.	An analysis of guano; showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts, and ammonia	10*s*.
„ 3.	An estimate of the value (relatively to the average of samples in the market) of sulphate and muriate of ammonia, and of the nitrates of potash and soda	10*s*.
„ 4.	An analysis of superphosphate of lime for soluble phosphates only	10*s*.
„ 5.	An analysis of superphosphate of lime, showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia ..	£1.
„ 6.	An analysis (sufficient for the determination of its agricultural value) of any ordinary artificial manure	£1.
„ 7.	Limestone:—the proportion of lime, 7*s*. 6*d*.; the proportion of magnesia, 10*s*.; the proportion of lime and magnesia	15*s*.
„ 8.	Limestone or marls, including carbonate, phosphate, and sulphate of lime, and magnesia with sand and clay ..	£1.
„ 9.	Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	£1.
„ 10.	Complete analysis of a soil	£3.
„ 11.	An analysis of oil-cake, or other substance used for feeding purposes; showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre; as well as of starch, gum, and sugar, in the aggregate	£1.
„ 12.	Analyses of any vegetable product	£1.
„ 13.	Analyses of animal products, refuse substances used for manure, &c.	from 10*s*. to 30*s*.
„ 14.	Determination of the "hardness" of a sample of water before and after boiling	10*s*.
„ 15.	Analysis of water of land drainage, and of water used for irrigation	£2.
„ 16.	Determination of nitric acid in a sample of water	£1.

N.B.—*The above Scale of Charges is not applicable to the case of persons commercially engaged in the Manufacture or Sale of any Substance sent for Analysis.*

The Address of the Consulting Chemist of the Society is, Dr. Augustus Voelcker, Cirencester, Gloucestershire, to which he requests that all letters and parcels (postage and carriage paid) should be directed: for the convenience, however, of persons residing in London, parcels sent to the Society's Office, No. 12, Hanover Square, W., will be forwarded to Cirencester once or twice a week.

Members' Veterinary Privileges.

I.—SERIOUS OR EXTENSIVE DISEASES.

No. 1. Any Member of the Society who may desire professional attendance and special advice in cases of serious or extensive disease among his cattle, sheep, or pigs, and will address a letter to the Secretary, will, by return of post, receive a reply stating whether it be considered necessary that Professor Simonds, the Society's Veterinary Inspector, should visit the place where the disease prevails.

No. 2. The remuneration of the Inspector will be 2*l.* 2*s.* each day as a professional fee, and 1*l.* 1*s.* each day for personal expenses; and he will also be allowed to charge the cost of travelling to and from the locality where his services may have been required. The fees will be paid by the Society, but the travelling expenses will be a charge against the applicant. This charge may, however, be reduced or remitted altogether at the discretion of the Council, on such step being recommended to them by the Veterinary Committee.

No. 3. The Inspector, on his return from visiting the diseased stock, will report to the Committee, in writing, the results of his observations and proceedings, which Report will be laid before the Council.

No. 4. When contingencies arise to prevent a personal discharge of the duties confided to the Inspector, he may, subject to the approval of the Committee, name some competent professional person to act in his stead, who shall receive the same rates of remuneration.

II.—ORDINARY OR OTHER CASES OF DISEASE.

Members may obtain the attendance of the Veterinary Inspector on any case of disease by paying the cost of his visit, which will be at the following rate, viz., 2*l.* 2*s.* per diem, and travelling expenses.

III.—CONSULTATIONS WITHOUT VISIT.

Personal consultation with Veterinary Inspector	5*s.*
Consultation by letter	5*s.*
Consultation necessitating the writing of three or more letters.	10*s.*
Post-mortem examination, and report thereon	10*s.*

A return of the number of applications during each half-year being required from the Veterinary Inspector.

IV.—ADMISSION OF DISEASED ANIMALS TO THE VETERINARY COLLEGE; INVESTIGATIONS, LECTURES, AND REPORTS.

No. 1. All Members of the Society have the privilege of sending cattle, sheep, and pigs to the Infirmary of the Royal Veterinary College, on the same terms as if they were Members of the College; viz., by paying for the keep and treatment of cattle 10*s.* 6*d.* per week each animal, and for sheep and pigs "a small proportionate charge to be fixed by the Principal according to circumstances."

No. 2. The College has also undertaken to investigate such particular classes of disease, or special subjects connected with the application of the Veterinary art to cattle, sheep, and pigs, as may be directed by the Council.

No. 3. In addition to the increased number of lectures now given by Professor Simonds—the Lecturer on Cattle Pathology—to the pupils in the Royal Veterinary College, he will also deliver such lectures before the Members of the Society, at their house in Hanover Square, as the Council shall decide.

No. 4. The Royal Veterinary College will from time to time furnish to the Council a detailed Report of the cases of cattle, sheep, and pigs treated in the Infirmary.

Royal Charter,

INCORPORATING THE

ENGLISH AGRICULTURAL SOCIETY

AS THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

March 26, 1840.

VICTORIA, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, to all to whom these presents shall come, greeting.

1. Whereas our right trusty and right entirely beloved cousin and counsellor, Charles Duke of Richmond, Knight of the most noble Order of the Garter, our right trusty and right entirely beloved cousin, George Henry Duke of Grafton, Knight of the most noble Order of the Garter, our right trusty and right entirely beloved cousin, John Henry Duke of Rutland, Knight of the most noble Order of the Garter, our right trusty and right entirely beloved cousin, George Granville Duke of Sutherland, our right trusty and entirely beloved cousin, Arthur Blundell Sandys Trumbal Marquess of Downshire, Knight of the most illustrious Order of Saint Patrick, our right trusty and right well beloved cousin and counsellor John Charles Earl Spencer, our trusty and well beloved Robert Henry Clive, Esquire, Sir Francis Lawley, Baronet, and Sir Thomas Dyke Acland, Baronet, our right trusty and well beloved counsellor Sir James Robert George Graham, Baronet, and our trusty and well beloved Henry

Handley and Joseph Neeld, Esquires, and others of our loving subjects, have formed themselves into a Society for the general advancement of English Agriculture, and for the purpose of prosecuting the following national Objects, Objects—1st. namely:—First, to embody such information contained in agricultural publications, and in other scientific works as has been proved by practical experience to be useful to the 2nd. cultivators of the soil; second, to correspond with Agricultural, Horticultural, and other Scientific Societies, both at home and abroad, and to select from such correspondence all information which, according to the opinion of the Society, may be likely to lead to practical benefit in the cultivation 3rd of the soil; third, to pay to any occupier of land, or other person who shall undertake, at the request of the Society, to ascertain by any experiment how far such information leads to useful results in practice, a remuneration for any loss that 4th. he may incur by so doing; fourth, to encourage men of science in their attention to the improvement of agricultural implements, the construction of farm-buildings and cottages, the application of chemistry to the general purposes of agriculture, the destruction of insects injurious to vegetable life, and the eradication of weeds; fifth, to promote the discovery of new varieties of grain and other vegetables useful to man 6th. or for the food of domestic animals; sixth, to collect information with regard to the management of woods, plantations, and fences, and on every other subject connected with rural 7th. improvement; seventh, to take measures for the improvement of the education of those who depend upon the cultiva-8th. tion of the soil for their support; eighth, to take measures for improving the veterinary art, as applied to cattle, sheep, 9th and pigs; ninth, at the Meetings of the Society in the country, by the distribution of prizes, and by other means, to encourage the best mode of farm cultivation and the breed of 10th live stock; tenth, to promote the comfort and welfare of labourers, and to encourage the improved management of their cottages and gardens: And have subscribed and expended divers large sums of money in the prosecution of these their national and patriotic objects, being regulated in their purpose by the strictest exclusion from their councils of every question of discussion having a political tendency, or which shall refer to any matter to be brought forward, or at any time pending in either of our Houses of Parliament: And having such objects, and being regulated by such essential principle, they have humbly besought us to grant unto them, and such other persons as shall be approved and elected in manner hereinafter mentioned, our Royal Charter of Incorporation for the several purposes aforesaid.

2. Now, therefore, know ye, that we, being anxious of promoting and encouraging by our Royal protection and patronage a series of objects which, prosecuted under the regulating principle of the exclusion of all those questions of debate on which the people of every individual country entertain sentiments so much at variance with each other, cann t fail to lead to results, affecting in the highest degree the prosperity of our people and the national wealth of our kingdom, have, of our especial grace and favour, given and granted, and do by these presents for us, our heirs, and successors, give and grant that the said Charles Duke of Richmond, George Henry Duke of Grafton, John Henry Duke of Rutland, George Granville Duke of Sutherland, Arthur Blundell Sandys Trumbal Marquess of Downshire, John Charles Earl Spencer, Robert Henry Clive, Sir Francis Lawley, Sir Thomas Dyke Acland, Sir James Robert George Graham, Henry Handley, and Joseph Neeld, and such others of our loving subjects as have formed themselves into, and are now, subscribers of the said Society, or who shall at any time hereafter become subscribers thereof, according to such regulations or bye-laws as shall be hereafter framed or enacted, shall by virtue of these presents be, and for ever hereafter continue to be, one body politic and corporate for the purposes afore-

Name. said, by the name of the "Royal Agricultural Society of England," by which name they shall have perpetual succession and a common seal, with full power and authority to alter, vary, break, and renew the same at their own discretion, and by the same name shall sue and be sued, implead and be impleaded, answer and be answered unto in every Court of us, our heirs, and successors, and be for ever able and capable in the law to purchase, receive, possess, and enjoy to them and their successors any goods and chattels whatsoever, and also be able and capable in the law (notwithstanding the statutes of Mortmain) to take, purchase, possess, hold, and enjoy to them and their successors a hall, and any messuages, lands, tenements, or hereditaments whatsoever, the yearly value of which, including the site of the said hall, shall not exceed in the whole the sum of Three Thousand Pounds, computing the same respectively at the rack-rent which might have been had or gotten for the same respectively at the time of the purchase or acquisition thereof, and to act in all the concerns of the said body politic and corporate, for the purposes aforesaid, as fully and effectually to all intents, effects, constructions, and purposes whatsoever, as any other of our liege subjects, or any other body politic or corporate, in our United Kingdom of Great Britain and Ireland, not being under any disability, might do in their respective concerns.

Seal.

To sue and be sued.

Power to hold Lands, &c.

3. And we do hereby grant our especial licence and authority unto all and every person and persons, bodies politic and corporate (otherwise competent), to grant, sell, alien, and convey in mortmain unto, and to the use of, the said Society and their successors, any messuages, lands, tenements, or hereditaments, not exceeding such annual value as aforesaid.

4. And know ye further, that in granting this our Royal Charter to the said Royal Agricultural Society of England, we do hereby declare it to be our full and entire will and pleasure that we extend our Royal protection to its national

objects, under the condition that a principle of its constitution shall be the total exclusion of all questions at its meetings, or in its proceedings, of a political tendency, or having reference to measures pending, or to be brought forward, in either of our Houses of Parliament, which no resolution, bye-law, or other enactment of the said body politic and corporate, shall on any account or pretence whatever be at any time allowed to infringe.

Exclusion of Politics.

5. We further declare, that the number of Subscribers of the said body politic and corporate shall be indefinite, but classed according to their election or rate of payment into governors and members, with such individual privileges as shall appertain respectively unto each, there being added to the Society such honorary, corresponding, and foreign members as may be found desirable for the promotion of its several objects.

Number.

Governors and Members.

6. It is also our will and pleasure, that there be three general meetings of such governors and members of the said Society held in each year, namely, two of these general meetings in London, in the months of May and December, and the other in such other part of England or Wales as shall be deemed most advantageous in time and place for the advancement of the objects of the Society. We further will and declare, that at such general meeting in London, to be held on the twenty-second or (should that date fall on a Sunday) on the twenty-third day of May, the governors and members shall have full power to elect a president and council, which president and council, although then duly elected, shall, nevertheless, not come into office until after the day of the annual country meeting next following, and shall then continue from that day in their respective offices and appointments for one year (more or less according to the date of the next annual country meeting); all vacancies occurring in such offices and appointments by resignation, death, or otherwise, to be filled up by election, and the

General Meetings.

Country Meeting.

Date of General Meeting.

President and Council.

Vacancies.

majority of votes of the remaining members of such president and council. That the council shall consist of one president, twelve trustees, and twelve vice-presidents, to be elected from the class of governors only, and of fifty other members, to be elected indiscriminately from the governors and members of the Society: That the president shall be an annual officer of the Society, and not re-eligible to the office of president for three years. And further, that twenty-five of the fifty general members of the council shall go out by rotation each year, but may be re-elected.

Council to consist of.

President

Retirement by rotation.

7. We further will, declare, and grant, that such general meeting in May shall have the full power and privilege of electing the president, trustees, vice-presidents, and other members of the council, from the governors and members as aforesaid; and that such president, trustees, vice-presidents, and council, shall be regulated in their proceedings by such bye-laws as may and shall from time to time be enacted by them conformably with the tenor of these letters patent, no established bye-law, however, being in any case altered, or new one proposed, without at least one month's notice of such intention being given to each member of the council. Further, that such president and council so elected shall have the power both to appoint, and, as they may think fit, to remove, one general secretary to the Society, who will be responsible to them for the execution and discharge of the various duties required of him, as defined from time to time by their bye-laws or special resolutions. And we further will and declare, that the said body politic and corporate may by him as their secretary sue or be sued, contract or discharge, in their name and on their behalf.

Election of Officers and Council

Bye-laws.

Notice of Alteration

Secretary

8. We further will and declare it as our Royal pleasure that the said Charles Duke of Richmond shall be the first president of the said Royal Agricultural Society of England, and that he, with the said George Henry Duke of Grafton, John Henry Duke of Rutland, George Granville Duke of

1st President.

Council.

Sutherland, Arthur Blundell Sandys Trumbal Marquess of Downshire, John Charles Earl Spencer, Robert Henry Clive, Sir Francis Lawley, Sir Thomas Dyke Acland, Sir James Robert George Graham, Henry Handley, and Joseph Neeld, shall be members of the first council, any three or more of whom shall hereby be invested with full power, being first duly summoned to attend, to appoint, on or within ten days preceding or following the twenty-fifth day of the present month of March, such persons to be trustees, vice-presidents, council, governors, members, honorary members, corresponding members, and foreign members, as they shall respectively think fit.

9. And we further will, grant, and declare, that the president and council shall have the sole management of the income and funds of the said body politic and corporate, and also the entire management and superintendence of all the other affairs and concerns thereof, and shall, or may, but not inconsistently with, or contrary to, the provisions of this our Charter or any existing bye-law, or the laws or statutes of this our realm, do all such acts and deeds as shall appear to them necessary or essential to be done, for the purpose of carrying into effect the objects and views of the said Royal Agricultural Society of England. Management.

10. In witness whereof we have caused these our Letters to be made patent. Witness ourself at our palace at Westminster this twenty-sixth day of March, in the third year of our reign.

By Writ of Privy Seal.

(Signed) EDMUNDS.

I.—LAWS CONTAINED IN THE CHARTER, WHICH CANNOT AT ANY TIME BE ALTERED OR DEPARTED FROM.

Name.

11. The Society is a corporate body, by the name of the Royal Agricultural Society of England, and has a Common Seal.

Exclusion of Politics.

12. It is a condition of the Royal Charter that a principle of the constitution of the Society shall be the total exclusion of all questions, at its meetings or in its proceedings, of a political tendency, or having reference to measures pending or to be brought forward in either House of Parliament; which no resolution, bye-law, or other enactment of the said body politic and corporate shall, on any account or pretence whatever, be at any time allowed to infringe.

Number.

13. The number of subscribers is indefinite; and classed into Governors and Members.

14. Power is given to elect Honorary, Corresponding, and Foreign Members.

General Meetings.

15. Three General Meetings are to be held in each year two of these in London, in the months of May and December; and the other in such part of England or Wales as shall be deemed most advantageous for the advancement of the objects of the Society. The General Meeting in London is to be held on the 22nd (or, should that date fall on a Sunday, on the 23rd) of May.

Election of President and Council.

16. The Governors and Members have full power to elect a President and Council at the general May Meeting; which President and Council, although then duly elected, shall nevertheless not come into office till the conclusion of the ensuing Annual Country Meeting to be held that year. All vacancies occurring in such officers and appointments, by resignation, death, or otherwise, are to be filled up by election and the majority of votes of the remaining Members of such President and Council.

Vacancies.

Council to consist of.

17. The Council is to consist of one President, twelve Trustees, and twelve Vice-Presidents, to be elected from the class of

Governors only; and of fifty other Members to be elected indiscriminately from the Governors and Members of the Society.

18. The President is to be an annual officer of the Society, and not re-eligible to the office of President for three years.

Retirement by rotation.

19. Twenty-five of the fifty general Members of the Council are to go out each year by rotation, but may be re-elected.

20. The General Meeting in May shall elect the President, Trustees, Vice-Presidents, and other Members of Council, from the Governors and Members.

Bye-laws.

21. The Council is to be regulated in their proceedings by such bye-laws as may and shall from time to time be enacted by them conformably with the tenor of the Charter: no established bye-law being in any case altered, or new one proposed, without at least one month's notice of such intention being given to each Member of the Council.

Appointment of Secretary.

22. The Council have power to appoint and remove one general Secretary to the Society; such Secretary to sue and be sued in their name and on their behalf.

Council Management.

23. The Council have the sole management of the income and funds of the said body politic and corporate; and also the entire management and superintendence of all other affairs and concerns thereof; and can—but not inconsistently with or contrary to the provisions of the Charter, or any existing bye-law, or the laws of the land—do all such acts and deeds as shall appear to them necessary or essential to be done for the purpose of carrying into effect the objects and views of the said Royal Agricultural Society of England.

II.—BYE-LAWS.

24. All existing Bye-Laws, Rules, and Regulations shall be rescinded, and the following be adopted in their places.

ADMISSION OF GOVERNORS AND MEMBERS.

Admission of Governors and Members.

25. Every candidate for admission into the Society must be proposed by a Member, the proposer to specify in writing the name, rank, usual place of residence, and post-town, of the candidate, either at a Council, or by letter to the Secretary. Every such

Election

proposal shall be read at the Council at which such proposal is made; or, in the case of the candidate being proposed by a letter to the Secretary, at the first meeting of the Council next after such letter shall have been received. At the next monthly Meeting of the Council the election shall take place, when the decision of the Council shall be taken by a show of hands; the majority of the Members present to elect or reject. The Secretary shall inform Members of their election by a letter, in such form as the Council may from time to time direct.

Duration of Membership, Governors, and Members.

Subscription

Foreign Members.

26. All Members belong to the Society, and are bound to pay their annual subscriptions, until they shall withdraw from it by a notice in writing to the Secretary. Governors shall pay an annual subscription of 5*l.*, and Members of 1*l.*; all subscriptions being due on the 1st of January in each year; but when the election takes place in December, the subscription paid in that month will be considered as the subscription of the following year. Governors may compound for their lives by paying 50*l.*; Members, by paying 10*l.* Governors or Members not resident in the United Kingdom are required on election to pay the life composition, in each case, for annual subscriptions. On and after the 1st of June, the subscriptions due at that date, and remaining unpaid, are in arrear; and no Member whose subscription is so in arrear shall enjoy any of the privileges of the Society; nor will any such Member be allowed to enter into a composition for his future payments until such arrear be paid: and no Governor or Member shall be allowed to transfer his name from one class of Members to the other, respectively, without the express leave of the Council.

Privileges

27. Governors have the privilege of attending and speaking at all Meetings of the Council, but not of voting, unless forming part of such Council. All Members are entitled, gratuitously, to the numbers of the Journal belonging to the year for which their subscription is paid; and have the privilege of inspecting all models presented to the Society, and of referring to the books in the library.

Register

28. An alphabetical Register shall be kept of all the Governors and Members, exhibiting the date of their election, and the subscriptions received or due from them, with the dates respectively of payment and arrear.

Honorary Members.

29. The Council, having the power of electing Honorary Members, shall elect as Honorary Members such eminent individuals

as have distinguished themselves in promoting the objects for which the Society was established; such Honorary Members shall not be called upon for the payment of any subscriptions; they shall have the privilege of attending and speaking at the Meetings of the Society and of the Council, but not of voting at either.

Dismissal.

30. Members may be dismissed from the Society in the following manner:—Any ten Members of the Society may send, in writing, signed by their names, to the Council, a request that any Member of the Society shall be dismissed from the Society. Such request shall be placed in a conspicuous part of the Council-room, and a copy thereof transmitted by post to the Member proposed to be so dismissed, signed by the Secretary. At the monthly Meeting of the Council which shall take place next after one month shall have elapsed after such request shall have been placed in the Council-room, the Council shall take the matter thereof into their consideration; but the Council shall not so take it into consideration unless twelve Members of the Council at the least shall be present. If this number be not present, the consideration of the request shall be adjourned to the next monthly Meeting of the Council, and so on till a monthly Meeting shall take place at which twelve Members are present. If the Council so constituted shall unanimously agree to the dismissal of such Member, he shall be no longer a Member of the Society; but if they shall not unanimously agree to his dismissal, their decision shall be considered to have been made in his favour. Provided always, that his dismissal shall not relieve him from the payment of any debt previously due by him to the Society; and that if a Life Governor or Life Member, he shall not have any claim to any portion of the commutation he has paid.

GENERAL MEETINGS.

General Meetings.

31. The two London General Meetings of the Society shall be held in the Council-room: public notice of such meetings being given in such newspapers as the Council may decide; and all elections (excepting that of the Council) and resolutions shall be determined by a show of hands. The General Meeting in December shall be held at such date in that month, and the Annual Meeting in the country at such time and place, as the Council may decide. The place of Meeting in the country shall be settled by the Council at the first Wednesday in May, and declared at the

Country Meeting

Persons to be present.

ensuing General Meeting in the year preceding such Meeting. At the General Meetings in London, reports from the Council, with a financial statement, will be read; Members only, or individuals bearing the President's written order, will be allowed to be present, each person giving his name in writing on being admitted.

Mode of electing President and Council.

32. At the General Meeting in May, the election of the President, Vice-Presidents, and Trustees, having taken place by a show of hands, the election of the twenty-five Members of the Council, who are to replace the twenty-five Members who retire by rotation, shall take place in the following manner:—

Members of Council

a. A list of the Members of the Council who retire by rotation, but who may be re-elected, shall be prepared on or before the 1st of May, for inspection of the Members at the rooms of the Society.

House list.

b. The Council shall prepare a list of the twenty-five Members whom they propose for election or re-election, which shall be printed on paper large enough to admit of additions being made to it; and a copy of this printed list shall be given to any Member who applies for it of the Secretary, either on the day of the General Meeting, or on any of the three days previously (Sundays excepted), between the hours of ten and four.

Voting, mode of.

c. The voting shall take place by each Member who wishes to vote giving in one of these lists signed by himself, with such names struck out or added, as he thinks fit, to the President, at the General Meeting, before the commencement of any other business. When the lists have been given in, three scrutineers shall be appointed by the President, who shall retire into another room, and inspect the lists which have been given in, and report forthwith to the Meeting, in writing, the names of the twenty-five Members who shall have the majority of votes; after which, the papers shall be immediately destroyed by the scrutineers. If any list should contain the names of more than twenty-five members, it will be rejected. No Member will be allowed to vote who does not personally deliver his list to the President. In the event of any equality of votes, the election shall be decided by the meeting on a show of hands.

THE PRESIDENT.

33. The President shall not be re-eligible to the office of President for three years from the day of his election. In all the official relations of the Society, he shall take precedence of all other Governors, Members, or Honorary Members, and shall have full power to summon at his pleasure meetings of the Council, and shall take the chair at every Council when present, he, and every other Chairman of the Society, having the privilege of a casting vote, in addition to his own, in all cases of equality in the division on any question. He shall sign all such letters, votes of thanks, and other documents, as the Council may direct, in the name and on the behalf of the Council. The President. Precedence. Casting Vote.

THE COUNCIL.

34. The Council may adjourn from time to time, at their discretion: when not so adjourned, they shall hold a meeting on the first Wednesday in every month, at twelve o'clock, for the election of Members and for the transaction of the business of the Society; and shall also meet on every other Wednesday, at the same hour, for the purpose of receiving the proposals of candidates, and hearing papers read: such Meetings to be held without summons. The Council. Adjournment. Monthly. Weekly.

35. Should the business of the Society require a Special Council to be held at any other time, the President shall have full power to direct such a Council to be summoned, at such time and place, and with such notice, as he may think fit: provided that, in case of necessity, the President may summon a special Council to be held forthwith; but any orders then made shall not remain valid unless confirmed by the next monthly Council. In the absence of the President, one Trustee, together with one Vice-President, and three other Members of the Council, shall have power to summon the Council in any case of emergency, on delivering to the Secretary an order signed by them for issuing the summonses, and allowing not less than seven days to elapse between the date of summons and the day appointed for the meeting of such Council. Special Council.

36. The Monthly Meeting of the Council shall have the full power of originating, discussing, and deciding, by the majority of votes, on a show of hands, all questions brought before it on the business of the Society. Should, however, any Member then present regard any proposition brought forward as too important for Monthly Council. Adjournment of important discussion.

immediate decision, he will be at liberty to take the sense of the Meeting whether such proposition should be postponed, in order that it may be duly discussed at the next Monthly Meeting; and should one-third of the Members present agree with him on that point, such proposition shall be postponed, and due notice of such motion and postponement shall be given to all Members of the Council by the Secretary.

Alteration of Orders of Council

37. No Order of Council shall be altered without one clear month's previous notice being given to each Member of the Council.

Notification of vacancy.

38. The Secretary shall notify to the Council on the printed agenda-paper, any vacancy which shall be declared in the list of Trustees, Vice-Presidents, or Members of Council, at the Meeting of the Council next after the happening of such vacancy, and such vacancy shall not be filled up until the Monthly Meeting of the Council which shall take place next after such notice.

Chairman

39. In the absence of the President, the chair shall be taken by a Trustee or Vice-President, and should neither of such officers be present, then by such Member as the Council shall choose as their Chairman by the majority of votes.

Quorum

40. The Quorum of a Monthly or Special Council shall be five, and that of a Weekly Council, three.

Order of business

41. At every Monthly Meeting of the Council the Minutes of the previous Monthly and other intervening Meetings shall be first read, and postponed matters shall take precedence in the order of business of new motions, excepting in the case of a Report from the Finance Committee, which shall always be taken first into consideration, immediately after the Minutes have been read and the election of Members and proposal of candidates have taken place.

42. All Minutes or Reports read at the Council shall be signed by the Chairman.

Seal

43. The Common Seal of the Society shall be kept in a box with three different locks, the keys of which shall be respectively held by the President of the Society, the Chairman of the Finance Committee, and the Secretary. The Common Seal shall not be affixed to any instrument except in the Council-room during a Meeting of the Council.

Reports to General Meetings.

44. The Reports from the Council to the General Meetings in London, in May and December, shall be prepared at the Council, on the first Wednesday in May and the first Wednesday in

December, respectively, or at some adjournment of such Councils.

Custody of Charter.

45. The Charter of the Society, Lease of the House, Secretary's Bond of Security, and other important documents belonging to the Society, shall be kept in a box confided to the custody of the Society's Bankers, and this box shall not be delivered up by them, excepting on a written order signed by the President or Chairman of Council Meeting, a Trustee, and the Secretary.

COMMITTEES.

Committees Enter on Duties.

46. The Standing Committees shall be appointed by the Monthly Council in December, but shall not enter on their respective duties until the first day of January, nor remain in force after the 31st of December of the ensuing year, unless re-appointed. Any other Committees may be appointed at a Monthly Council.

Chairman.

47. Each Committee, at its first Meeting, shall elect its own permanent Chairman, who shall always take the chair at the Committee, when present; the chair being taken in his absence by a Chairman to be elected by the Committee for the occasion: and all Committees shall meet by summons issued by direction of their respective Chairmen, or of the President, or of any three Members of the Committee, or by adjournment. The President, Trustees, and Vice-Presidents, shall be Members *ex officio* of all Committees.

Summons.

Ex officio Members.

48. All Committees during their sittings may report the progress of their proceedings to the Monthly Meetings of the Council, and shall sit till they have made their respective general reports; but in case such reports shall not have been made previously to the 31st of December next following their appointment, their powers shall then cease.

SECRETARY.

Duties.

49. The Secretary shall devote the whole of his time to the affairs of the Society, and shall be immediately responsible to the Council for the discharge of the various duties they require him to perform. He shall attend the sittings of all Meetings of the Council. He shall also attend on any Committee requiring his presence, when not in attendance on the Council. He shall take the minutes of the Council; and also, when attending upon any Committee, the minutes of such Committee, if required to do so by the Chairman.

Correspondence.

50. He shall conduct the correspondence of the Society, preserving the letters he may receive in a classed arrangement, and shall keep a daily register of all correspondence in a classified form. He shall keep letter-books, in which copies of all letters shall be entered which he writes by direction of the President, Council, or Committees.

Money.

51. Under the direction of the Finance Committee he shall receive or be responsible for all monies received at the rooms of the Society, paying such sums into the hands of the bankers, and producing at each Finance Committee their receipts for the same; and, with the exception of the amount allowed him for petty cash, he shall not retain in his hands any money belonging to the Society, but shall pay it over forthwith to the Society's bankers. He shall have the charge of the expenditure of petty cash.

52. All receipts for money received on behalf of the Society shall be out of a book with counterpart.

Cash-book.

53. All monies received and paid shall be entered daily in a general cash-book.

54. He shall have the custody of all books, models, and papers belonging to the Society. All books, pamphlets, &c., sent to the Society shall be stamped with the Society's stamp at once.

Superintendence of Clerks, &c.

55. He shall have the immediate superintendence over the Clerks and Servants of the Society; and shall be required to report to the Council any instances of misconduct on their part which he thinks of such a nature as to require the consideration of the Council.

Power to sue and be sued.

56. Agreeably with the Charter, the President and Council have the power by him, as their Secretary, of suing or being sued, and of contracting or discharging obligations, according to the special nature of the authority with which they may from time to time invest him, as their representative, for these several objects.

Salary.

57. He shall be resident in the Society's house. His salary shall be 400*l*. per annum, with coals and lighting.

Security.

58. He shall find approved security to the amount of 1000*l*.

Rooms.

59. The rooms of the Society shall not be underlet.

60. He shall not be a Governor or Member of the Society.

Clerks and Servants.

61. The Council shall have the power of appointing and removing such clerks and servants as they may deem necessary, and of fixing their salaries.

FINANCES.

Finances. Time of meeting. Report.

62. The Finance Committee shall have the immediate care of the Society's accounts, and no payment of money shall be made excepting at a Monthly Council, and unless recommended by the Report of the Finance Committee, which shall always meet on the first Wednesday in every month, without summons, previously to the sitting of the Council, in order to prepare a Report on the state of the Society's funds, which they shall present to each Monthly Meeting, and lay before it the following account:—

Monthly Cash Account, ending

	£.	s.	d.		£.	s.	d.
Balance of petty cash in the hands of the Secretary last month . .				Payments by order of the Council . .			
Balance at the bankers'							
Amount of cash received during the past month by the Secretary, and paid into the hands of Messrs. Drummond, as per bankers' receipts .				Amount of expenditure of petty cash . . .			
				Balance in hand . .			
Ditto, received by Messrs. Drummond on account of the Society, as per bankers' book . . .				Bankers. . . .			
				Secretary . . .			

and a statement of the payments recommended to be made, together with all the books in which entries of cash receipts or payments are made, and such documents as the business of the day may require. Should a sufficient number of Members of the Finance Committee to form a quorum not have assembled on the first Wednesday of any month, the Secretary shall report the state of the Society's funds to the Council.

Audit. Auditors.

63. Twice in every year—namely, on the Friday previously to each of the London General Meetings—there shall be an audit of the accounts of the Society at eleven o'clock, when a balance-sheet shall be prepared and reported to the General Meeting, and such balance-sheet published in the ensuing part of the Journal. The Auditors shall consist of the President, the Trustees, the Members of the Finance Committee, and of three Members not being Members of the Council or of any of the

Balance-sheet of Country Meeting.

Committees (of whom two shall always be present) to be chosen at the London General Meeting in December. A complete balance-sheet of the Country Meeting of each year shall in future appear in the last Journal of the Society for the same year.

Signature of drafts.

64. All drafts on the bankers shall be signed by the President (or, in his absence, by the Chairman of the Council) and by one of the Trustees, being countersigned by the Secretary, and a book shall be kept in which a consecutive entry shall be made of all such payments.

JOURNAL.

Journal.

65. The Journal Committee shall have the care of the publication of the Journal; of which two parts shall be published every year, one in February, and one in August. They shall decide on the papers which shall be printed in the successive parts of the Journal, and shall also recommend, at their discretion, the disposal to be made of communications important or interesting in their nature, but of a character unsuitable for the immediate objects of the Journal. The Committee, though responsible for the selection of matter, and the importance of its bearings in an agricultural point of view, are not responsible for the positive accuracy of the facts stated in the several papers—a circumstance depending on the judgment, caution, and observation of the authors themselves.

Responsibility of authors.

66. Each Member is entitled gratuitously to those parts of the Journal which belong to any year for which his subscription has been paid: but no Journals shall continue to be forwarded to any Member whose subscription is in arrear.

EDITOR.

Editor.

67. The duties of Editorship shall be performed under the general superintendence of the Journal Committee, and subject to the regulations made by them from time to time.

68. An Editor shall be appointed of literary and scientific ability, competent to discharge the under-mentioned duties in a creditable and satisfactory manner, whose salary shall be 500*l.* per annum. Subject to revision and alteration by the Journal Committee, the duties which the Editor will be called upon to discharge shall be as follows.—

Duties.

To prepare original papers for the Journal, and to assist the Journal Committee in the selection of fitting subjects for

Prize Essays, and in adjudicating upon the Essays when received.

To correspond with those persons who are best qualified to afford sound and original information on agricultural topics, more especially on new or controverted questions, with a view to obtaining literary contributions from them for the Journal.

To classify and examine all letters or other documents referred to the Journal Committee by the Council, and report to the Committee as to their suitability for publication.

To supervise generally the publication of the Journal, both by preparing the articles for the printer and correcting the proof.

The whole of the Editor's time shall be at the disposal of the Society.

PRIZE SHEETS.

Date of settling.

69. The Prize Sheet for the Country Meeting shall be settled at a Special Council to be held on the Thursday of the Smithfield Club-week in December.

PRIZE-ESSAYS.

70 All information contained in Prize-Essays shall be founded on experience or observation, and not on simple reference to books or other sources.

71. Drawings, specimens, or models, drawn or constructed to a stated scale, shall accompany writings requiring them.

Motto.

72. All competitors shall enclose their names and addresses in a cover, on which only their motto, and the subject of their Essay, and the number of that subject in the Prize list of the Society, shall be written.

Who to open.

73. The President or Chairman of the Council, for the time being, shall open the cover on which the motto designating the Essay to which the Prize has been awarded is written, and shall declare the name of the author.

Unsuccessful Essays.

74. The Chairman of the Journal Committee shall alone be empowered to open the motto-paper of such Essays, not obtaining the Prize, as he may think likely to be useful for the Society's objects, with a view of consulting the writer confidentially as to his willingness to place such paper at the disposal of the Journal Committee.

Copyright.

75. The copyright of all Essays gaining prizes shall belong to the Society, who shall accordingly have the power to publish the

whole or any part of such Essays; and the other Essays will be returned on the application of the writers; but the Society do not make themselves responsible for their loss.

Conditions.

76. The Society are not bound to award a prize unless they consider one of the Essays deserving of it.

77. In all reports of experiments the expenses shall be accurately detailed.

78. The imperial weights and measures only are those by which calculations are to be made.

79. No prize shall be given for any Essay which has been already in print.

80. Prizes may be taken in money or plate, at the option of the successful candidate.

81. All Essays must be addressed to the Secretary, at the house of the Society.

LIBRARY.

Library.

82. There shall be a Library of the Society, of which a catalogue shall be kept, and all donations of books shall be referred to the Journal Committee to decide whether the books shall be accepted. A register shall be kept in which an entry shall be made of all presents of books which are so accepted, and of all seeds, implements, and models, together with the names of the donors.

83. No model, implement, or other object can be exhibited to the Society without leave from the Council.

COUNTRY MEETINGS.

Country Meetings.

84. The Council reserves to itself the right to adopt, at all Country Meetings, such arrangements as may seem most conducive to the general objects of the Society, without binding itself to adopt or follow the arrangements of previous years.

85. In all matters of compensation the responsibility rests with the local authorities, and not with the Council of the Royal Agricultural Society of England.

86. No person who shall have been shown, to the satisfaction of the Council, to have been excluded from exhibiting for prizes at the exhibition of any society, in consequence of having been convicted of an attempt to obtain a prize by giving a false certificate, shall be allowed to compete for any of the prizes offered by the Royal Agricultural Society of England, at any of its meetings.

BYE-LAWS.

87. No existing bye-law shall be altered, or any new one made, except at the Meeting of the Council, on the first Wednesday in May or the first Wednesday in December, one month's notice having been previously given in writing to the Council, and a copy of such notice having been sent by the Secretary to each of its Members: Provided always, that nothing in this bye-law shall prevent the bye-law proposed being altered or amended by the Council at the time it is under consideration.

88. All bye-laws shall be entered in a book to be kept for that purpose, and signed by the President and Secretary for the time being, and new bye-laws or alterations entered therein forthwith.

Passed at a Council held on the 1st of May, 1861.

(Signed) POWIS, President.
H. HALL DARE, Secretary.

III.—RESOLUTIONS.

PRESIDENT.

89. On the day the first Council in May, or an adjournment thereof, meets to prepare its Report to the General Meeting of the Society, the election of President for the ensuing year shall be considered. **Consideration of.**

COUNCIL.

90. Each Member of the Council shall be requested to nominate, in writing, to the Secretary, such Members of the Society as he would propose to supply any of the vacancies in the Council, on the Wednesday prior to the printing of the list annually laid before the Council, he having previously ascertained that such Members would be willing to attend the Council. The Secretary shall add to the usual form of list, columns containing the name proposed, and stating by whom proposed; and also a column stating the number of Councils and Committees attended by each Member, who goes out by rotation, and is eligible for re-election. **House List to Council.**

COMMITTEES.

Annual Report of Committees

91. In future the standing Committees of each year shall make a written Report to the Monthly Council, in December, stating the number of times they have met, and the number of Reports they have made to the Council during the year for which they were appointed.

FINANCE.

Life Compositions.

92. No compositions for life shall be made applicable to the current expenses of the Society.

Accountant.

93. There shall be a professional accountant to the Society, appointed by the Finance Committee. He shall regularly examine the Society's accounts, and report thereon to the said Committee, as required by them.

Quarterly Statement.

94. The Finance Committee shall cause to be prepared an account of the state of the Society's Finances, showing 1st, a quarterly balance-sheet of receipts and expenditure; 2nd, a quarterly statement of property; 3rd, a quarterly statement of subscriptions and arrears.

95. The above accounts shall be made up to the last days of March, June, September, and December, and laid before the Council at the ensuing monthly meeting.

JOURNAL.

Implement Reports.

96. The Reports on the Implements exhibited at the Country Meetings should appear in the Journal, which will in future be published, the first Number in February, and the second as early in August as practicable, or within a month after the Country Meeting.

REPORTING.

I. *Monthly Councils:—For Society's use.*

97. At Monthly Councils it is not desirable that speeches of Members should be reported at length, but the Secretary shall prepare notes of the business done, the principal grounds of the decisions arrived at, and the numbers of the majority and minority in each case.

98. In order to facilitate the preparation of such a Report the Secretary shall be assisted by one of his clerks, who shall attend the Council Meetings, and thus enable him to give his undivided attention to the business which is under consideration.

99. No motion or amendment shall be put to the Council

unless it be written out at length, and signed by the Member proposing it.

II. *Monthly Councils:—For the Press.*

100. The Secretary shall as soon as practicable, after the rising of the Council, prepare a Report for the press, embodying all decisions arrived at, and stating the numbers by which each motion was affirmed or negatived, but not giving any Report of the speeches made.

101. The substance of all Reports of Committees presented to the Council shall be published unless otherwise specially ordered by the Council.

III. *Weekly Councils.*

102. The Secretary shall prepare a Report of the proceedings of each Weekly Council, which shall be furnished to the papers as soon as practicable after the conclusion of the Meeting. A *précis* of this Report shall be entered in the Minute Book. In cases where any written paper is read or laid before the Council, which is of too great length for immediate insertion in the proceedings, it shall be referred to the Editor to report upon at the following Weekly Council.

COUNTRY MEETING.

Inspection Committee.

103. The place of holding the Annual Country Meeting shall not be decided upon until a Committee, of which at least three Members shall have acted as the Director or Stewards of the Yard (three to be a quorum, one of which shall have acted as Director or Steward) shall have visited and inspected such towns and their localities as the Council shall think fit, and have reported upon their respective suitableness for the purposes of the Society.

Agreement.

104. No agreement which may be entered into with Local Authorities relative to the place of the Annual Country Meeting, shall be held good unless the Corporate Seal, attested by the signature of the Mayor, shall be affixed to such document

Stewards of Finance.

105. There shall be at least four Stewards appointed for regulating the entrances to the Show Yard at the Country Meeting, whose duties shall be to inspect from time to time the Register of the Telltales, and to see that the money taken out of the boxes corresponds with the Register, making a note on a tabular form of card the *time* at which such examination took place,

and distinguishing whether in excess or deficiency in the amount shown on the Register.

Stewards.

106. At the Country Meeting of the Society there shall be three Stewards for each department, viz.: three for the implements and three for the stock; one of whom only, in each department, shall go out of office at the end of the year, and another be appointed; so that two experienced Stewards may remain in office.

107. No Member who has not paid his subscription for the current year is qualified to make an entry for the Country Meeting of the Society, or to exhibit as a non-subscriber.

Free Admission to Show Yard.

108. Governors and Members of the Society who have paid their subscriptions for the current year shall be admitted to the Show Yard, during the time it is open to the public, without payment, by tickets issued by the Secretary, which tickets shall not be transferable; and any Governor or Member who shall be found to transfer or lend his ticket shall be reported to the Council, and shall in future forfeit the privileges of Membership.

Signature.

109. Each Member shall sign his name, and write his address, with a declaration of his Membership, on the back of the official ticket, and shall also sign in the Gate-book at the Special Entrance, if required to do so.

Tickets, application for.

110. Application for the Member's ticket shall be made in London, either by post or personally not later than the Friday preceding the week of the Show, and afterwards at the Secretary's office in the Show Yard.

DINNER.

111. In future, if any Dinner be held at the Country Meetings, under the patronage of the Society, the entire management shall be vested in the Local Committee; but the Council shall have the option and power of reserving and taking such a number of tickets as they shall think fit; and this Society shall nominate the chairman and supply the list of toasts, but shall have no other liability connected with it.

JUDGES.

112. Any Member of the Society who nominates a Judge shall be requested to certify that of his own personal knowledge he knows him to be qualified and willing to act as a Judge for whatever classes he may be proposed to be appointed; and that he

is as far as he knows unconnected with any exhibitor of Stock or maker of Implements, and that he has no direct personal interest in the Stock exhibited, as the breeder of any particular animal upon which he might be called upon to adjudicate. The list of names so proposed (stating by whom proposed) shall be, as heretofore, referred to the Committee of the Council, whereof the Stewards of the Yard of the year preceding shall be *ex officio* Members. In case of a sufficient number of competent persons not being proposed, the Committee are ordered to add the names of such other persons as they may know to be competent and willing to act.

113. A circular shall be sent in the first week of April to each Member of Council, requesting him to send to the Secretary, before the Monthly Meeting in May, the names of persons qualified and willing to act as Judges of Stock, to serve as an addition to the names sent in by the Members of the Society.

114. The list of names of persons recommended as Judges shall be placed in the Council-room, and a copy sent to each Member of Council two weeks before the Committee of selection proceed to select the Judges; and any Member of the Society shall be at liberty to apply to the Secretary for a list of names, and to send in writing to the Secretary his objections to any name on the list, such objections to be laid before the Committee of Selection.

JUDGES' REPORTS.

115. The Editor shall be instructed to correct any inaccuracies of style or clerical errors.

116. The consulting engineer shall be requested to correct any inaccuracies in the description of the machinery, or the records of the working of the implements; but any alteration in the Report of a Judge of implements which is not included under either of the foregoing heads shall be submitted to the acting Senior Steward of the Implements and the Chairman of the Journal Committee, and shall not be adopted without their approval.

PRIZE SHEET.

117. No offer of a Prize at the Country Meeting of any year shall be taken into consideration by the Council after the first Wednesday in the month of February of such year of Meeting. Offer of Prize

118. It shall be an instruction to the Stewards to endeavour, if Protests.

possible, to decide all protests against the awards of the Judges at the Country Meeting, before the conclusion of the Meeting. Such protests shall be delivered to the Stewards at the Director's Office, in the Show-yard, before six o'clock on the Thursday evening of the Show-week; and no protest shall be *subsequently* received unless satisfactory reasons be assigned for the delay.

Reserve Number.

119. A reserve number shall be given by the Judges in each class of Live Stock.

Exhibition Fee.

120. The charge for all Stock exhibited shall be 5*s.* for each entry, in addition to the 10*s.* paid by non-Members.

Society not responsible for Damage.

121. A clause shall be inserted in the conditions, stating that the Society will not in any case hold itself responsible for any loss, damage, or mis-delivery of such live stock, or implements, or other articles exhibited at the Society's Shows.

122. In case of Local Prizes being offered, the *same* animals shall not be entered to compete for *both* the Society's *and* the Local Prizes.

Correctness of Certificate.

123. It shall be incumbent on Exhibitors to prove the correctness of their certificates, if called upon by the Stewards or the Council to do so.

Examination of Horses.

124. No horse shall be exhibited without a certificate from a Member of the Royal College of Veterinary Surgeons as to the state of the animal with reference to hereditary diseases, particularly those of the respiratory organs, which certificate shall accompany the Certificate of Entry; but the above shall not supersede the usual examination by the Society's Veterinary Inspector.

Examination of Pigs.

125. All pigs exhibited at the Country Meetings of the Society shall be subjected to an examination of their mouths by the Veterinary Inspector of the Society; and should the state of dentition in any pig indicate that the age of the animal has not been correctly returned in the Certificate of Entry, the Stewards shall have power to disqualify such pig, and shall report the circumstance to the Council at its ensuing Monthly Meeting.

BOOK FOR RESOLUTIONS.

126. A book shall be kept in which all Resolutions shall be entered, with a reference in the index and the dates of being passed.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

June 1861.

List of Governors.

† Life Governor's mark.

†His Royal Highness The Prince Consort, K.G....Windsor Castle

†Acland, Sir Thomas Dyke, Bart., M.P....Killerton Park, Collumpton
Akroyd, Henry...Doddington Hall, Nantwich
†Alcock, Thomas, M.P....Kingswood Warren, Epsom
†Aldam, William, jun....Frickley Hall, Doncaster
Antrobus, Sir Edmund, Bart....Amesbury Abbey, Salisbury
†Appold, John George...23, Wilson Street, Finsbury
Arkwright, J. Hungerford...Hampton Court, Leominster
†Ashburton, Lord...The Grange, Alresford

†Bailward, John...Horsington, Wincanton
†Barclay, David...Grove Hill, Falmouth
†Barker, John Raymond...Fairford Park, Fairford, Gloucestershire
Barker, Thomas Raymond...Hambleden, Henley-on-Thames
Barrow, William Hodgson, M.P....Southwell, Nottinghamshire
†Bath, Marquis of...Longleat, Warminster
†Belper, Lord...St. Helens, Derby
†Berners, Lord...Keythorp Hall, Leicester
Betts, Edward Ladd...Preston Hall, Maidstone
Blount, William...Orchhill, Gerrard's Cross, Bucks
Bosanquet, George Jacob...Broxbournebury, Hoddesdon, Herts
Bowes, John...Streatham Castle, Staindrop, Durham
Bramston, Thomas William, M.P....Skreens, Chelmsford
Brandreth, Humphrey...Houghton House, Dunstable
Bridges, Sir Brook William, Bart., M.P....Godnestone Park, Wingham, Kent
Bridport, Lord...Cricket Lodge, Chard, Somersetshire
Briscoe, John Ivatt, M.P....Fox Hill, Chertsey, Surrey
†Brown, James...Rossington, Bawtry
Buccleuch, Duke of, K.G....37, Belgrave Square
†Buller, Edward...Dilhorne Castle, Cheadle, Staffordshire
Buxton, Sir Robert Jacob, Bart....Shadwell Court, Thetford

Cabbell, Benjamin Bond...1, Brick Court, Temple
Camoys, Lord...Stonor Park, Henley-on-Thames
Campden, Viscount...Campden, Gloucestershire
Carnarvon, Earl of...High Clere Castle, Newbury
Challoner, Colonel B....Portnall Park, Staines
†Chesham, Lord...Latimer, Chesham, Bucks
Chichester, Earl of...Stanmer Park, Lewes, Sussex
†Childers, John Walbanke...Cantley Hall, Doncaster
†Cholmeley, Sir Montague J., Bart., M.P...Easton Hall, Colstersworth, Linc

†Clive, Rev. Archer...Whitfield, Hereford
†Copeland, Alderman, M.P....The Poplars, Leyton, Essex
Cotes, John...Woodcote, Newport, Shropshire
†Cottenham, Earl of...Tandridge Court, Tandridge, Surrey
Courtauld, Samuel...Gosfield Hall, Halsted, Essex
†Craven, Earl of...Combe Abbey, Coventry
Curteis, Major Edward Barrett....Leesam House, Rye

Darnley, Earl of ..Cobham Hall, Gravesend
†Dartmouth, Earl of...Patshall Hall, Wolverhampton
De Grey and Ripon, The Earl...Studley Royal, Ripon
De La Warr, Earl...Buckhurst Park, East Grinstead, Sussex
Denison, John Evelyn, M P....Ossington, Newark, Nottinghamshire
†Derby, Earl of...Knowsley Hall, Prescot, Lancashire
Dering, Sir Edw. Cholmeley, Bart ....Surrenden-Dering, Charing, Kent
Devonshire, Duke of...Holkar Hall, Milnthorpe, Westmoreland
Dickinson, Francis Henry...King's Weston, Somerton, Somersetshire
Downshire, Marquis of...East Hampstead Park, Oakingham, Berks
†Dysart, Earl of...Buckminster Hall, Colstersworth, Lincolnshire

Egmont. Earl of...Cowdray Park, Petworth
Essex, Earl of...Cassiobury Park, Watford, Hertfordshire
†Etwall, Ralph...Andover
Evans, Thomas William, M P....Allestree Hall, Derby
†Eversley, Viscount...Heckfield Place, Hartford Bridge, Hants
†Exeter, Marquis of, K G....Burghley House, Stamford, Lincolnshire
Eyre, Charles...Welford, Newbury, Berkshire

Farquharson, John James...Langton, Blandford
Feilding, Viscount...Downing, Holywell
†Fellowes, Edward, M P....Ramsey Abbey, Huntingdon
Feversham, Lord...Duncombe Park, Helmsley, Yorkshire
Foley, J H Hodgetts, M P....Prestwood, Stourbridge, Worcestershire
†Fortescue, Earl...Castle Hill, South Molton, Devon
†Freeland, H. W., M.P....Chichester
Freshfield, James William...Mynthurst, Leigh, Reigate
†Fuller, Francis...21, Parliament Street

Gibbs, Ben. Thomas Brandreth...47, Half Moon Street, London
†Graham, Rt. Hon. Sir James R. G., Bart., M.P, G.C.B.....Netherby, Carlisle
Grey, Earl...Howick House, Alnwick

Hale, Robert Blagden...Alderley Park, Wootton
Hamilton-Nisbet, Right Hon R. A., M.P...Bloxholme Hall, Sleaford, Lincolnshire
Hamond, Anthony...Westacre Hall, Brandon
†Harcourt, George Simon...Burgh Castle, Great Yarmouth
Hartley, W. H. H....Lye Grove, Cross Hands, Sodbury, Gloucestershire
Hatherton, Lord...Teddesley Hall, Penkridge
Hayter, Right Hon. Sir Wm. Goodenough, Bart., M.P...Stowberry Park, Wells, Somersetshire
Heathcoat, John, M.P ...Bolham, Tiverton
†Heneage, George Fieschi, M P... Hainton Hall, Wragby
†Henniker, Lord...Thornham Hall, Eye, Suffolk

†Heywood, Thomas Percival...Claremont, Manchester
†Hill, Viscount...Hawkstone Park, Shrewsbury
Hippisley, Henry...Lambourne Place, Hungerford
†Hobbs, William Fisher...Boxted Lodge, Colchester
†Hoghton, Henry...Bold Hall, Warrington
†Holford, R. Stayner...Weston Birt House, Tetbury, Gloucestershire
Holland, Edward, M.P....Dumbleton Hall, Evesham, Worcestershire
Hope, Henry Thomas...The Deepdene, Dorking, Surrey
Hoskyns, Chandos Wren...Harewood, Ross
†Hulse, Col. Sir Edward, Bart....Breamore House, Fordingbridge, Hampshire
†Hunt, Zachary D....Aylesbury

Ingilby, Rev. Henry John...Ripley Castle, Ripley, Yorkshire

Johnstone, Sir John V. B., Bart., M.P...Hackness Hall, Scarborough

Kerrison, Sir Edward Clarence, Bart., M.P....140, Piccadilly
†Knight, Frederick Winn, M.P....Wolverley House, Kidderminster

Langston, J. Haughton, M.P....Sarsden House, Chipping Norton, Oxfordshire
Lansdowne, Marquis of, K.G...Bowood Park, Calne, Wiltshire
Leaconfield, Lord...Petworth House, Sussex
†Le Couteur, Colonel...Belle Vue, Jersey
Legh, William John...Lyme Park, Stockport
Leicester, Earl of...Holkham Hall, Norfolk
†Leigh, Lord...Stoneleigh Abbey, Warwickshire
Lemon, Sir Charles, Bart....Carclew, Penrhyn, Cornwall
†Long, Walter, M.P....Rood Ashton, Trowbridge, Wilts
†Lonsdale, Earl of...Lowther Castle, Penrith
Lovelace, Earl of...East Horsley, Ripley, Surrey

Marlborough, Duke of...Blenheim Park, Oxon
†Marshall, William, M.P....Pattendale Hall, Penrith
†Miles, Sir William, Bart., M.P....Leigh Court, Bristol, Somersetshire
Mills, Thomas...Tolmers, Hertford
Milward, Richard...Thurgarton Priory, Southwell, Notts.
Morrison, Alfred.. Fonthill House, Hindon, Wilts
Murray, Charles Robert Scott...Danesfield, Marlow, Buckinghamshire

Naper, James Lennox William...Lough Crew, Old Castle, Ireland
†Northwick, Lord...Athenæum Club, S.W.

Palmer, Robert...Holme Park, Reading, Berkshire
Patten, Col. John Wilson, M.P...Bank Hall, Warrington, Lancashire
Pennant, Hon. Col. Edw. Gordon Douglas, M.P....Penrhyn Castle, Bangor
†Perkins, Algernon...Hanworth Park, Hounslow, Middlesex
Pole, E. S. Chandos...Radbourne Hall, Derby
†Popham, Francis Leyborne...Littlecott, Hungerford, Berks
†Portman, Lord...Bryanston House, Blandford, Dorsetshire
†Powis, Earl of...Powis Castle, Welshpool

†Radnor, Earl of...Coleshill House, Highworth, Wilts
Ratcliff, Sir John, Knt....Wyddrington, Edgbaston, Birmingham

Rayleigh, Lord...Terling Place, Witham, Essex
Ridley, Sir Matthew White, Bart ...Blagdon, Morpeth, Northumberland
Rigg, Jonathan...4, Chester Place, Hyde Park Square, W.
Robartes, Thos. J. Agar, M.P....Lanhydrock House, Bodmin
Rogerson, John...St. Alban's Villa, Highgate Rise, N.
Roupell, William, M.P....16, St. James's Square, S.W.
†Rutland, Duke of...Belvoir Castle, Grantham

Saint Germans, Earl of...Port Eliot, Devonport
†Sanford, Edward Ayshford...Nynehead Court, Wellington, Somersetshire
†Scholey, William Stephenson...Lauriston, Larkhall Lane, Clapham, S.
†Shadwell, Lucas...Fairlight, Hastings
Shelley, Sir John Villiers, Bart., M.P....Maresfield Park, Uckfield, Sussex
†Slaney, Robert Aglionby, M.P....Walford Manor, Shrewsbury, Salop
†Smith, John Abel...37, Chester Square
†Sondes, Lord...Elmham Hall, Elmham, Norfolk
Sotheron-Estcourt, the Right Hon. H. S. B. E., M.P....Bowden Park, Chippenham
†Southampton, Lord...Whittlebury Lodge, Towcester
Stafford, Lord...Cotessy Hall, Norwich
Stanhope, John Spencer...Cannon Hall, Barnsley, Yorkshire
†Stradbroke, Earl of...Henham Park, Wangford, Suffolk
Sutton, John Manners...Kelham, Newark, Notts

†Tanqueray, John Samuel...Hendon, Middlesex
Taunton, Lord...Stowey, Somersetshire
†Thompson, H. S., M.P. ...Kirby Hall, York
†Thorold, Sir John Charles, Bart....Syston Park, Grantham
†Torrington, Viscount...Yokes Court, Mereworth, Kent
Towneley, Lieut.-Col. Charles...Towneley, Burnley, Blackburn
Tunno, Edward Rose...Warnford Park, Bishop's Waltham
Tuxford, George Parker...246, Strand

Walsh, Sir John, Bart., M.P. ..Warfield Park, Bracknell, Berkshire
Walsingham, Lord...Merton Hall, Thetford, Norfolk
Warner, Edward, M.P....Higham Hall, Woodford
†Warwick, Earl of...Warwick Castle, Warwick
Westminster, Marquis of, K.G....Motcombe House, Shaftesbury
†Whitbread, William Henry...Southhill House, Bedford
†Williams-Chancellor, the Rev. Sir Erasmus, Bart....Llanywormwood Park, Carmarthenshire
Wilmot, Edward Woollett...Buxton, Derbyshire
†Wilson, Fuller Maitland...Langham Hall, Bury St. Edmund's
†Wilson, Henry...Stowlangtoft Hall, Bury St. Edmund's
Wilshere, William...The Frythe, Welwyn
Wood, George, Hanger Hill, Ealing, W.
Wynn, Sir Watkin Williams, Bart., M.P....Wynnstay, Rhuabon, Denbighshire

†Yarborough, Earl of...Manby Hall, Glanford Bridge, Lincoln

Zetland, Earl of...Aske Hall, Richmond, Yorkshire

List of Members.*

† Life Member's mark.

A.

†Abbey, George ..Silsworth Lodge, Daventry
Abbey, John...The Grange, Wellingborough
Abbot, Chas H... Bower, Long Ashton, Bristol
Abbott, Evelyn...Lowdham, Nottingham
†Abbott, Stephen, jun. .Castleacre, Swaffham
Abbott, Wm .Hill Farm, Gt Wigborough, Colchester
†Abergavenny, Earl of . Birling Manor Maidstone
Abraham, Rev T E . .Barton Place, Mildenhall
Abraham, Thomas ..Dunster, Taunton
†Abrey, Thos. S. H. ..Witham, Essex
†Ackers, James ..Prinknash Park, Painswick
Acland, Sir Pere P. F Palmer, Bart .Bridgewater
Acland, Thos Dyke ..Sprydoncote, Exeter
†Acworth, N B .. The Hook, Northaw, Middlesex
Ackroyd, William ..Otley
†Adair, A. .Heatherton Park, Wellington, Somerset
Adair, Sir R. Shafto, Bart. . 20A, St James' Square
Adam, Alexander . Boulogne sur Mer
Adams, G. T ...Hawkhurst, Kent
Adams, Tho New House, Marden, Herefordshire
Adcock, William...Farndish, Wellingborough
†Adderley, Rt Hon C B ,M P Hams Hall, Minworth
Adkins, George C ...The Lightwoods, Birmingham
Adney, G... Harley, Much Wenlock
Adney, John . Rowton, Wellington, Salop
†Ahrens, E. New Schlagsdorf, Schwerin, Mecklenburg
†Akroyd, Edward, M P.. Bank Field, Halifax
Alderman, Rev F C Kintbury, Hungerford
Alderman, Robert...Farndish, Wellingborough
†Alderson, John... Thornby Villa, Wigton
Aldous, Robert...Burlingham, Norwich
†Aldworth, W , jun ..Frilford, Abingdon
Alexander, Caledon ..Sudbury
†Alington, G. M ...Swinhope House, Louth
Alison, John.. Brightlands, Reigate
Allday, John...Griston, Wotton, Norfolk
†Allen, B Haigh.. Longcrofts Hall, Lichfield
Allen, Chas W ...The Moor, Kington, Herefords
Allen, John R .. Lyngford House, Taunton
Allen, Henry...Oakfield, Hay, Herefordshire
Allen, Ralph S . .Bathampton, Bath
Allen, Rev. Dr... Downham Market, Norfolk
Allen, Thomas...Thurmaston, Leicester
Allen, Thomas...Upton Cottage, Macclesfield
Allen, W. T. Little Stambridge Hall, Rochford, Essex
Allenby, George. .Wallington, Louth, Lincolnshire
†Allfrey, H. W...Hemingford Ho , Stratford-on-Avon
†Allfrey, Robert...Wakefield Park, Reading
Allender, G M... Manor Farm, Quainton, Winslow
Allerton, George R. Birling, Rochford, Essex
Allington, Rev J Little Barford, St Neots, Hunts
Allix, Charles. .Willoughby Hall, Grantham
Allsop, Henry...Foremark Hall, Burton-on-Trent
†Ambler, Henry. .Watkinson Hall, Halifax
Ames, John...Clevelands, Lyme, Dorset
Ames, George Henry...Cote House, Bristol
Ames, Lionel. .The Hyde, St Alban's
†Amhurst, W. A T . .Didlington Park, Brandon
Amos, Charles E . Greenfield House, Sutton, Surrey
†Anderson, Alexander...Horsmonden, Kent
Anderson, David. .Westhaven, Carnoustie, Forfar
†Anderson, R ...Grey Street, Newcastle-upon-Tyne
Anderson, Robert A. Cirencester
Anderton, G jun Howden Dyke, Howden, Yorks
Andrew, George. Farmers' Club, St Austell
Andrewes, C. J. . Kate's Grove Iron-Works, Reading
Andrus, Francis . Scadbury, Southfleet, Gravesend
Angers, Wm Neswick, Driffield
Angeworth, Wm . Fardington House, Bridgnorth
Ankers, Robert B . Tarvin, Chester
†Annandale, P ...Shipley Grove, Newcastle-on Tyne
†Anson, Sir John, Bart . .Avisford, Arundel
Anstey, Samuel .Menabilly Farm, Par Station
Anstice, J .. Madeley Wood House, Broseley, Salop
†Anstruther, J H L .Hintlesham Hall, Ipswich
†Anstruther, Sir R A Bt Balcaskie, Leven, Fifeshire
Aplin, Henry ..Combe St Nicholas, Chard, Somerset
Appleby, F. Dawkins Briggate, Leeds
†Applewhaite, Edward.. Pickenham Hall, Swaffham
†Arbuthnot, John A....Coworth, Chertsey, Surrey
†Arcedeckne, Andrew...Glevering Hall, Suffolk
Arkcoll, Wm .Langney, Westham, Eastbourne
Arkcoll, Thomas.. Langley, Eastbourne
Arkell, H ...Butlers Ct , Boddington, Cheltenham
†Arkell, T .Pier Hill Farm, Swindon, Wilts
Arkell, Thomas Boddington, Cheltenham
Arkwright, Rev. J ..Mark Hall, Harlow, Essex
Arkwright, Peter.. Willersley, Matlock, Derbyshire
Armitage, Arthur Moraston, Ross, Herefordshire
Armstrong, G . Heddon on-the-Wall Northumb.
Armstrong, H , M D Peckham Ho , Peckham, S E.
Armstrong, John. .Palterton Chesterfield
Armstrong, Robert...Over Tabley, Knutsford
Armytage, Col H..Broomhill Bank, Tonbridge Wells
Arnold, Lewin...The Hale, Calne, Wilts
Arnold, Rev Richard A ...Ellough, Beccles
Arnold, Thomas O ...Park, Winkleigh, Devon
Arthur, Lieut -Col. C....Misterton Hall, Lutterworth

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* The names of 60 Members are omitted on account of their Subscriptions to the Society being in arrear to Dec. 31st, 1859.

Ashby, T. W. ..Rutland Terrace, Stamford
Ashcroft, Thomas...Walford, Eccleshall, Staffs
Ashdown, S. H. ..Uppington, Wellington, Salop
Ashhurst John H....Waterstock, Oxford
Ashlin, John...Firsby, Spilsby
Ashton, G. F . Stormer Hill, Totlington, Bury
†Ashton, Henry...Woolton, Liverpool
Ashton, T. Henry...The College Farm, Cirencester
†Askew, Sir H. ..Pallinsburn Ho., Coldstream, N.B
†Astbury, William...4, Munster Terrace, Fulham
†Astley, F. L Estrange.. Melton Constable, Thetford
†Aston, Rt. Hon. Sir A , Bt...Aston Hall, Cheshire
†Aston, Samuel...Bushwood Lodge, Warwick
†Athorpe, J. C....Dinnington Hall, Rotherham
Athreton, George T... Beech Cottage, Wrexham
Atkins, Alfred...Farnham, Slough, Bucks
Atkinson, Benj. Manston Lodge, Whitkirk, Leeds
Atkinson, E....Laurel Bank, Potternewton, Leeds
†Atkinson, James...Winderwath, Penrith
†Atkinson, J. H. H....Angerton, Morpeth
Atkinson, John...Charlton, Salisbury
†Atkinson, W... Gt. Rapers, Bures St Mary's
Atkinson, W. S.. Barrowby Hall, Whitkirk, Leeds
Atkinson, William...Ashton Heyes, Chester
†Atkinson, W. James ..Marlow, Buckinghamshire
Attenborough, I....Brampton Ash, Market Harbro'
Attwater, J. Gay. Cubberley, Cheltenham
Aveland, Lord. Normanton Park, Oakham
Avery, Thomas Charles ..(Solicitor), Gloucester
Awbery, F. D... St Lawrence Wootton, Basingstoke
†Aylmer, H ...West Dereham, Stoke Ferry, Norfolk
†Aylmer, J B ...Fincham Hall, Downham, Norfolk
Aylmer, John H .. Walworth Castle, Darlington
†Aylmer, R B ...Westacre Abbey Swaffham
†Aynsley, I. Murray . Underdown, Ledbury
†Aytoun, R. S. ..Inchdairnie, Kirkcaldie, N B

B.

†Babington, Chas C., M A...St John's, Cambridge
†Back, John Alfred.. Thorpe Hamlet, Norwich
Bacon, Rev. H ...Baxterley Rectory, Atherstone
Bacon, James, Pluckley, Ashford, Kent
†Backhouse, Edmund...Polam Hill, Darlington
Badcock, Benjamin. Broad Street, Oxford
Badcock, Henry. .Taunton
Badcock, P... 36, Eastbourne Terr , Hyde Park, W.
Badger, W. H. .Syerscote Manor, Tamworth
Badham, G D....Bulmer, Sudbury
†Bagot, Rt Hon. Lord. .Blithefield, Rugeley, Staff
†Bailey, James...Nynehead, Wellington, Somerset
†Bailey, Wm....Hazling, Belford, Northumberland
†Bailey, Hamilton.. Ash Hall, Cowbridge
Baillie, Wm. Hunter...4, Upper Harley Street
†Baillie,Rev.E...Lawshall Recty ,Bury St Edmund's
Baily, Rev. H G . .The Vicarage, Swindon
Baily, J., sen ...113, Mount Street, Berkeley Square
Baily, T F.. .Hall Place, Leigh, Tunbridge
Bainbridge, C. H....Lumley Park, Durham
Bainbrigge, W. H.. Woodseat, Ashbourne, Derbysh
Baines, John Fuller ..Stisted, Braintree, Essex
Baker, Anne.. Grendon, Atherstone
Baker, Benjamin Heath...Acle, Norwich
Baker, George W.. .Parknook, Quorndon, Derby
†Baker, Lake J .. Hargrave, Kimbolton
Baker, James...Drayton Bassett, Tamworth
†Baker, John...
†Baker, Sir E Baker, Bart. .Ranston Ho., Blandford
Baker, T Barwick L....Hardwick Court, Gloucester
Baker, Thomas...Barton, Cambridge
Baker, William.. Purewell House, Christchurch
†Baker, William H .Westington, Campden, Glouc
Baldwin, B F. ..The Ox Leasowes, Tardebigg
Baldwin, John. Luddington, Stratford-on-Avon
Balfour, D....Balfour Castle, Kirkwall, N.B
†Balmer, Thomas...Fochabers, N B
Balston, Thomas . Chart Sutton, Staplehurst
Bancks, James ..Prebendal House, Thame
†Bankes, John Scott...Soughton Hall, Northop
Banks, Ed. R R. G ...Sholden Lodge, Deal
†Banks, John Jackson ..Kendal
Banks, Wm. J...West Cliffe, Dover
†Bannerman, Alexander...South Cottage, Chorley
†Bannerman, Henry . Hunton Court, Maidstone
Bannister, J S . Weston, Pembridge, Herefordshire
Barber, Miles .Barlborough, Chesterfield
Barber, S W . Hayton Castle, Bawtry
†Barbour, R . Bolesworth Castle, Tattenhall
Barchard, F . .Horsted Place, Horsted, Uckfield
Baring, Hon. and Rev F . Melchit Park, Salisbury
Baring, John ..Oakwood, Chichester
†Barker, G I Raymond...The Crofts, Fairford
†Barker, H.B Raymond University Cl ,Suffolk St
Barker, H ...Suffolk Fire Office, Bury St Edmund's
Barker, J H ...Rowsley, Bakewell, Derbyshire
Barlow, F .The Shrubbery, Hasketon, Woodbridge
Barlow, Rev Peter.. Cockfield Rectory, Staindrop
Barnard, Charles.. Norwich
Barnard, Fulke Toovey. Bristol
Barnardiston, Nathaniel C . The Ryes, Sudbury
†Barneby, William...Clater Park, Bromyard
Barnes, C ...Chorley Wood House, Rickmansworth
Barnes, G ..Knowle Farm, Wimborne
Barnes, Ralph Exeter
†Barnes, T , M P ...The Quinta, Chirk, N.W
†Barnett, Charles..Stratton Pk , Biggleswade, Beds.
Barnett, Henry...Glympton Park, Woodstock
Barnett, J... Remenham Hill, Henley-on Thames
Barnett, R....Meopham Court, Gravesend
Barratt, John R ...Maiden Hill, Penrith
Barrett, G. A... Kate's Grove Iron-Works, Reading
Barrett, John B....Milton House, Steventon, Berks
Barrington, Visc....Beckett House, Faringdon,Berks
Barrington, Wm... Thorley, Isle of Wight
Barroby, Miss Elizabeth .Dishforth, Thirsk
†Barrow, Chas. James ..Lopham, Norfolk
†Barrow, John James ..Normanton Hall, Southwell
†Barrow, Wm. Bilbrooke House,Wolverhampton
Barrs, T . Brompton Hall, Churchstoke, Salop
†Barstow, Charles D ...Garrow Hill, York
Barter, Rev C. ..Sarsden, Chipping Norton
Bartholomew, W....Goltho, Wragby, Lincolnshire
†Barthropp, N G....Cretingham, Wickham Market
†Barton, Charles.. Holbrook House, Wincanton
Barton, Gerard. .Fundenhall, Norfolk
†Barton, Rev. H. N .. St. Ervan Rectory, Padstow

Barton, J. H....Stapleton Park, Pontefract
Barton, R. Watson. .Springwood, Manchester
†Barwell, Thomas...Leicester
Baskerville, H...Crawshay Park, Reading, Berks
Bass, Michael T., M P. ..Burton-on Trent
Bass, W. .Duckenfield Lodge, Ashton-under-Lyne
Bassett, Richard...Bonvilstone, Cardiff
Bastard, T. Horlock. .Charlton Marshall, Blandford
†Batard, T. M. Bearda...Ramsden Crays, Billericay
Bate, Edward ..Kelsterton, Flintshire, N.W
Bate, Samuel...Springfields, Newcastle-under-Lyme
Bateman, Henry.. Asthall, Witney, Oxfordshire
Bateman, Lord . Sholden Court, Leominster
†Bates, George ..Blaxhall Hall, Wickham Market
Bates, Thomas, jun ..Eaton Green, Luton, Beds.
Bathurst, Earl . Cirencester, Gloucestershire
Bathurst, Hon Wm. L....38, Half-Moon Street, W.
†Batson, Thos....Combe House, Bath
Batt, William Henry.. West Drayton, Uxbridge
Batten, Abraham...Avott St. Peter's Welwyn, Herts
†Batten, John...Yeovil, Somersetshire
†Baxendale, J. . Woodside, Whetstone, Middlesex
Baxendale, Richard B ..Whetstone, Herts.
Baxter, H. J ..5, Ladbroke Square, Notting Hill, W.
Baxter, Robert...Doncaster
†Bayden, Thomas. .Hythe, Kent
Bayley, Thomas . Lenton, Nottingham
Bayley, William...Britwell Farm, Maidenhead
Bayne, William...High Street, Oxford
Bayning, Rt. Hon & Rev Ld...Honingham Hall, Norf.
Beach, Joseph...Flour Mill, Dudley
†Beadel, James...Broomfield Lodge, Chelmsford
Beadon, Rev. F. ..North Stoneham Rectory, Hants
Beale, T T....237, High Holborn, W C.
†Beale, William.. Larkins Farm, Chiddingstone
†Bearcroft, E . .Mere Hall, Droitwich, Worcestersh
Beard, W....Tormarton, Cross Hands, Cirencester
Beards, Thomas...Stowe Park, Buckingham
Bearn, William ..Finedon Hill, Higham Ferrers
†Beart, Robert .. Godmanchester, Huntingdonshire
Beaseley, John Brampton, Northampton
†Beattie, James.. Newbie House, Annan, N B
†Beauchamp, Earl Madresfield Court, Worcester
Beaumont, E B . .Woodhall, Barnsley, Yorkshire
Beaumont, Francis H .. Buckland Court, Reigate
†Beaumont, Geo., jun ...Bridgeford Hill, Notts
†Beaumont, J. A Westhill, Wimbledon, Surrey
†Beaumont, W. B Bywell Hall, Newc.-on-Tyne
Becher, Rev. John Drake. Southwell
Beck, Charles W. Upton Priory, Macclesfield
Beck, J.. St. Ann Street, Lynn, Norfolk
Beck, Peter Shrewsbury
Beckett, Richard.. Watton Abbey, Driffield
Beckett, Wm., M P.. .Kirkstall Grange, Leeds
Beckwith, Rev H . Eaton Constantine, Wellngtn ,Sal
Beddard, J. ..Holloway Ho.. Prestwood, Stourbridge
Beddoe, George.. Lickhill, Stourport
Beddoe, Richard C....4, Whetherell Place, Clifton
Beddoes, W Minton ..Wistanstow, Shrewsbury
Beever, Rev. William Holt ..Cowbridge
Beevor, Henry. .Blyth, Worksop
Begbie, Alexander.. Lytham, Preston, Lancashire
Belcher, Charles . Little Coxwell, Faringdon
Belcher, R. Shirley...Burton-on-Trent
†Beldam, Valentine...Royston, Hertfordshire
†Bell, Daniel...Hollins, Whitehaven
Bell, Capt Henry. .Chalfont Lodge, Cheltenham
Bell, Henry...West Sherbourne, Durham
Bell, J. Williams .Gillingham, Bath
Bell, John...Breaks Hall, Appleby, Westmoreland
Bell, M ...Bourne Park, Canterbury
Bell, Thos....Brampton Town Foot, Cumberland
Bell, William Read.. Gillingham, Bath
†Bence, Capt... Kentwell Hall, Long Melford
Bence, Henry A ...Thorington Hall, Saxmundham
Benington, T.. Wallingfen Ho., North Cave, Yorks.
Benington, William.. Stockton-upon-Tees
†Bennell, Joseph ..Hitchin, Herts
Bennett, R. Gully...Tresillian House, Probus
†Bennett, B.E .Marston Trussell Hall, Rugby
Bennett, E. ...Bedstone Ho., Aston-on-Clun, Salop
Bennett, James . Ingestone, Ross
Bennett, John.. Little Rissington, Stow-in-the-Wold
Bennett, Joseph B H... Tutbury, Burton-on-Trent
Bennett, T . .Park Farm, Woburn, Bedfordshire
Bennett, Thos. Oatley. Bruton, Somersetshire
Bennett, Wm....Regent Street, Cambridge
Bennion, Ed David...Summer Hill, Oswestry
Benson, Alan. .Papcastle, Cockermouth
†Benson, George ..Lutwyche Hall, Wenlock, Salop
Benson, John Tavistock
Bentall, Edward H Heybridge, Maldon, Essex
Bentley, Henry...Woodlesford, Leeds
Bentley, Robert J . .Finningley Park, Bawtry
Benyon, Rev E R . Culford Hall, Bury St Edm.
†Benyon, R , M P . .Englefield House, Reading
Beridge, Rev. Basil ..Algarkirk, Spalding
†Berners, John . Holbrook, Ipswich
†Berney, Sir H , Bart Sheepy, Atherstone, Warw
Berry, Kemp ..Woodgate, Beckley, Sussex
Besley, Henry. South Street, Exeter
Best, George...Compton, Guildford
†Best, Hon. and Rev S .. Abbotts Ann, Andover
Best, Rev. Thomas Red Rice House, Andover
Bethell, William . Rise, Beverley
Bettinson, R . Cawthorpe, Bourne, Lincolnshire
Betts, John. .King's Langley, Hertfordsh[illegible]
Bevan, Beckford . (Banker), Bury St Edmund's
Beverley, Benjamin...Leeds
Beverley, Matthew B ...Leeds
Biddell, G Arthur.. Ipswich
†Biddell, Manfred...Playford, Ipswich
†Biddell. W.. Hawstead Hall, Bury St. Edmund's
Biddulph, Robert. .Ledbury, Herefordshire
Biddulph, Col R.M , M.P Chirk Castle, Chirk, N.W.
Biel, W.. St. Leonard's Farm, Beaulieu, Southpton
Bigg, E Smith ..The Hyde, Slaugham, Sussex
Bigg, T. Leicester Ho , Gt. Dover Street, Southwark
Bigge, Charles Selby...Linden, Morpeth
Bigge, Matthew Robt....Newcastle-upon-Tyne
Biggs, James.. Desborough, Kettering
Bill, John. .Trent Vale, Stoke-on-Trent
Billington, Leonard...Bull Hotel, Preston, Lancashire
Bingham, Col R H...Binghams Melcombe, Dorchester
Birch, William John ..R. A. College, Cirencester
Birch, Wyrley...Writham Park, Thetford

†Birchall, T Kibbleton Hall, Preston, Lancashire
†Bircham, William G Dunton, Fakenham
†Bird, J Yaxley, Stilton, Huntingdonshire
Bird, Geo .. Chessington Court, Kingston, Surrey
†Bird, Rev J Waller Briston, East Dereham
†Birkbeck, Henry Norwich
Birket, C . Plungington Hall, Preston, Lancashire
Birkin, Richard . Apsley House, Nottingham
Birmingham, Wm Killerton, Broadclist, Devon
Birt, Jacob 30, Sussex Gardens, Hyde Park, W
Biscoe, T P B . Kingellie House, Newton, Inverness
Bishop, John 3, The Walk, Market Pl , Norwich
Black, Edward . High Street, Boston
Black, John Marske Farm, Redcar, Yorkshire
Blackbourn, D Temple Brewer, Sleaford, Linc.
Blackburne, J I Hale, near Warrington
Blackburne, Lt -Col J , jun. Hale Hall, Warrington
Blackden, J C Heatherslaw Ho , Coldstream, N B
†Blacker, M M Claremount, Claremorris, Mayo
Blackett, Sir E , Bart. Matfen, Newcastle-on-Tyne
Blackstone, J . 1, Gloucester Rd Regent's Park, W
Blagrave, Col John Calcot Park, Reading, Berks
†Blair, John
Blake, Francis John Norwich
Blake, Jas . Birchmore, Blackwater, Isle of Wight
Blake, William Budge, South Petherton
Blake, Wm John Danesbury, Welwyn
Bland, William Hartlip, Sittingbourne
Blane, Colonel Robert .
†Blanshard, Richard 53, Chancery Lane, W C.
Blencowe, J George, M P Dannys, Hurstpierpoint
†Blencowe, Robert A The Hooke, Lewes
Blencowe, Robert Willis The Hooke, Lewes
†Blisset, Rev H Letton, Weobley, Hereford
Blomfield, John Warham, Wells, Norfolk
Bloomer, G B Moreton Hall, Chirk
Bloxsidge, Samuel Warwick
Blundell, J Bursleden, Southampton
Blurton, W Mountfort Field Hall, Cheadle
Blyth, D'Urban Great Massingham, Rougham
Blyth, H E Sussex Farm Burnham, Lynn
†Blyth, James 21, Hyde Park Gardens, W.
†Board, John Westerham, Sevenoaks
Boards, W[illegible]iam . Edmonton
†Boby, Charles Hutton, Ipswich
Bodenham, Charles Hereford
†Body, R B Hyde End Shinfield, Reading
Boger, Deeble Wolsdon, Devonport
†Boghurst, William P Friating Abbey Colchester
Boileau, Sir J P., Bt Ketteringham Pk, Wymndham
Bolden, Samuel E . Springfield Hall, Lancaster
†Bolitho, Edward Pendlverne, Penzance
†Bolitho, T S . Pendlverne, Penzance
†Bolitho, William Penzance
Bolton, Daniel Birley Park, Witney, Oxon
Bolton, Lord Bolton Hall, Bedale
Bond, Barnabus Alburgh, Harleston, Norfolk
Bond, Benjamin Draycot, Cheadle, Staffordshire
Bond, Rev N . The Grange, Holme, Wareham
Bond, Robert Tavern Street, Ipswich
Bond, T. J Perry Elm Wellington, Somerset
Bone, Henry Avon, Ringwood, Hants
Bonham, Rev J Ballintaggart, Ballitore, Ireland
Bonnell, J. H . . Pelling Place, Old Windsor
†Bonner, H C . . East Rudham, Rougham, Norfolk
†Booth, James Godfrey. Hamburgh
Booth, John B.. . Killerby, Catterick, Yorkshire
Booth, John Cotham, Newark, Nottinghamshire
Booth, Richard . . Warlaby, Northallerton
Booth, S Lister. . . Bramley, Leeds
Booth, W H. . .
Booth, Sir Williamson, Bt. Paxton Park, St Neots
†Borough, C B . . Chetwynd Pk , Newport, Salop
Borthwick, John. . . Prospect, Carrickfergus
†Bortier, Monsieur La Panne
Borton, John. . Barton-le-Street, Malton
Bosanquet, Rev. R W Rock, Alnwick
Bosley, John. . Lower Leyde, Hereford
Bostock, Ellis . 41, Hunter St , Brunswick Square
Bostock, Thomas. . Hill Top, Burslem
†Botfield, Beriah. . Norton Hall, Daventry
†Botham, George Wexham Court, Slough, Bucks
Botley, William Martin, Salisbury
Bott, William . Nantwich
Botting, William Hurstpierpoint
†Bouck, John T 13, Oxford Street, Manchester
Boultbee, J Novadd Ho , [illegible]erayron, South Wales
†Bourn, J , jun . Mawley Cleobury-Mortimer
Bourne, John . Hildenstone, Stone, Staffordshire
Bourne, William Atherstone
Bouverie, Hon P P., M P Brymore, Bridgewater
Bowater, Gen Sir E , K C H Richmond Park, Surrey
Bowen, George Coton Hall Prees, Market Drayton
Bowen, P W . Shrawardine Castle, Shrewsbury
†Bower, Edward. . Closworth, Yeovil
Bower, Capt Thomas B . Iwerne House, Blandford
Bowly, David Cirencester
Bowly, Edward . Siddington House, Cirencester
Bowly, William C. Cirencester
Bowser, R (Solicitor), Bishop Auckland, Durham
Bowstead, William Hackthorpe Hall Penrith
†Bowyer, Capt. H. A . Steeple-Aston, Woodstock
Box, John .
Boxall, W B . Strathfield Saye, Winchfield
Boyer, W. . Skeffington Vale, Billesden, Leicester
Boys, John . Goldhanger, Maldon
Boys, Robert. . Eastbourne
Braby, James . Maybanks, Rudgwick, Horsham
Bracebridge, C H Atherstone Hall, Atherstone
Bradburne, J Hanbury . Pipe Place, Lichfield
Bradbury, Thomas. . Longroyd, Brighouse
Bradbury, Thomas Swanwick Winsford, Cheshire
Braddock, Henry . Bury St. Edmund's
Bradford, Thomas. . Cathedral Steps, Manchester
Bradley, Thomas Richmond, Yorkshire
†Bradshaw, John Knowle, Cranley, Surrey
Bradshaw, W . Slade Ho , Levenshume, Manchester
Bradstock, Thomas S. . Cobrey Park, Ross
Bramwell, C . Hardwicke Hall, Ferry Hill, Durham
Braginton, George . . Torrington, Devon
†Braikenridge, J. H. . . . Chew Magna, Bristol
Bramley, Charles. . Fiskerton Hall, Lincoln
Brand, Hon. Henry, M.P. . Glynde, Lewes
†Brander, R. B . Tanbridge House, Horsham
Brasnett, J . Hilboro' Lodge, Brandon, Norfolk
Bravender, John. . . Cirencester

Bray, George...The Haven, Dilwyn, Leominster
†Breach, J G . 12, Pelham Place, Brompton
Breavington, W G K . Bath Road, Hounslow, W.
Brett, John Lowdham Corfe Lodge, Wimborne
†Bretts, Chas. ..Exbury House, Fawley, Hampshire
Brewster, S N .Beacon Hill House, Woodbridge
Brickwell, C J Overthorpe Lodge, Banbury
Bridge, Thomas . Wynford Eagle, Dorchester
Bridge, Thomas Buttsbury, Ingatestone
Briggs, John A Eastgate House, Tenterden
†Briggs, Rawdon Birstwith Hall, Ripley, Yorksh
†Bright, John Teddesley Park Farm, Penkridge
Bright, John, M D 19, Manchester Square
Brigstocke, W O Blaenport, Newcastle Emlyn
Brinckman, Lady Sundorne Castle, Shrewsbury
†Brise, S B R Spains Hall, Finchingfield, Braintree
Bristol, Marquis of 6, St James's Square, S W
Broadmead, Philip Milverton, Somerset
Bromet, William R Cocksford, Tadcaster
Bromley, James Cockerham, Lancaster
Bromley, John . Derby
Bromley, John Lancaster
Bromley, Robert Derby
Bromwich, Thomas Woolston, Coventry
Brook, Arthur Sawyer Bexhill, Battle
Brook, J Park Farm, St Helen's, Isle of Wight
Brooke, Edward Marsden House, Stockport
Brooke, John W Sibton Park, Yoxford, Suffolk
Brooke, John, jun .Capel, Ipswich
†Brooke, Sir R, Bart Norton Priory, Runcorn
Brooke, Rev John Haughton, Shiffnall
Brooke, T J Langford Mere Hall, Knutsford
†Brooke, Wm, jun Northgate Ho, Huddersfield
†Brooke, W De Capell. The Elms, Market Harbro'
Brookes, Wm, Captain Elmstree House, Tetbury
†Brooks, Bernard Lyford, Abingdon
Brooks, James H Henley-on Thames
Brooks, J M 7, Charlotte Street, Manchester
Brooks, Samuel Bank, Manchester
Broomfield, Thomas Lauder, N B.
Broomhall, I F Beech Cliffe, Newcastle, Staffords.
Broughton, Rev C Norbury Rectory, Ashbourne
Broughton, E D Westaston Hall, Nantwich
Broughton, I Almington Hall, Market Drayton
Brown, David Cathedine House, Brecon
†Brown, Douglas 1[illegible], Hertford Street, Mayfair
Brown, Edward Estate Office, Northallerton
Brown, George Avebury, Chippenham
Brown, George Roborough House, Barnstaple
†Brown, Rev H H Burton, Sleaford
Brown, Henry . Ashby de la-Zouch
Brown, James 17, Minto Street, Edinburgh
Brown, John Tring
Brown, John Coldham Hall, Wisbeach
Brown, J Washbourne Ufcott, Swindon
Brown, Rev Lancelot R Kelsal Saxmundham
Brown, Michael L Cliffe Ville, Stoke-on Trent
†Brown, Potto Houghton, Huntingdon
†Brown, Thomas Buckham Hall, Uckfield
†Brown, Thomas Marham, Norfolk
Brown, Thos James The Moor, Hereford
Brown, William Tring
Brown, William...Devizes (North Wilts Foundry)
†Brown, William.. Richmond Hill, Liverpool
†Browne, Lord John Thomas .Westport, co Mayo
Browne, Edward.. Oaklands, St Albans
Browne, R P Gt. Hallingbury, Bishops Stortford
Browne, Rev T C 59, High Street, Oxford
Browne, Thomas Beale Hampen, Andoversford
Browne, Thos B . Mellington Hall, Montgomery
†Browne, W. Monkton Farleigh Ho, Bradford, Wilts
Browne, William Titchwell, Lynn
Browning, A H Heath Lodge, Iver, Bucks
Bruce, Maj C. L C, M P . Dunphail, Forres, N B.
Bruce, John Tiddington, Stratford on-Avon
Bryan, Frederick Thos . Humberstone, Leicester
Bryan, John Southleigh, Witney
Brymer, John 1, Belvedere, Weymouth
†Bubb Anthony Witcombe Court, Gloucester
Buchanan, James. 20, Blomfield Road, Maida Hill
Buchanan, Walter . Lower Babington, Birkenhead
†Buck, Albert Sansome Terrace, Worcester
†Buckingham, Duke of ..Wootten, Aylesbury
Buckland, Thomas, jun . Wraysbury, Staines
Buckland, George Benenden, Cranbrook, Kent
Buckley, Gen E P, M P New Hall, Salisbury
Buckley, John N .Normanton Hill, Loughborough
Buckworth, T R Cockley Cley Hall, Swaffham
†Budd, J Palmer Ystalafera, Swansea
Budd, William . Aston-le-Walls, Daventry
†Budd, Thos W .13, Norfolk Crescent, Hyde Pk
Buddicom, Wm B .. Penbedw Hall, Mold
Buggins, W Booth's Farm, New Oscott, Birming
†Bulford, James Hordley Farm, Woodstock
†Bulkeley, Sir R W, M P. Baron's Hill, Beaumaris
Bull, Alban Hanwell, Banbury
Bulled, Edmund. Witheridge, Devonshire
Bullen, E Irish Farmers Cl, Sackville St, Dublin
†Bullen, John T Marshwood Manor, Crewkerne
Buller, Sir A, Bart .Pound, Plymouth
Buller, James Wentworth, M P . Downes, Crediton
†Buller, Morton Edward . Dilhorne, Cheadle
Bullmore, R Stowgate Farm, Market Deeping
†Bullock, F Woodlands Hall, Eling, Southampton
†Bullock, George East Coker, Somerset
Bulmer Charles Hereford
†Bult, James S Dodhill Ho, Kingston, Taunton
Bulwer, Rev James Hanworth Rectory, Thetford
Bulwer, Wm Lytton Heydon Hall, Reepham
Bunbury, Henry M Marlston House, Newbury
Bunny, Edward John . Slinfold, Horsham
†Bunsen, G Bourg-Rheindorf, Bonn, Prussia
Burbery, J J Crofts, Alveston, Stratford on-Avon
Burch, Walter J Campsey Ash, Woodbridge
Burden, R Castle Eden, Stockton-on-Tees
Burdon, George Heddon Ho, Newcastle-on Tyne
Burgess, Capt H W . 3, Lancaster Ter, Regent's Pk.
Burgess, Robt . Winterbourne, Zelston, Blandford
Burgess, William 9[illegible], Newgate Street, City, E C
Burgoyne, Sir J M, Bt .Sutton Park, Potton, Beds
Burkill, I W Winteringham, Barton-on-Humber
Burleigh, Robert W. Halesworth
Burn, Robert Scott .Stockport
Burnell, Edward Roydon, Diss
Burnell, F P Winkburne Hall, Southwell, Notts
Burness, Wm....2, South Place, Acre Lane, Brixton

Burnett, Alex....6, Hawley Villas, Camden Town
Burnett, D ...Ashley, Stockbridge, Hants
Burnett, Gregory...Dee Cottage, Flint
Burnett, Thomas. . Hutton, Preston, Lancashire
Burnham, W. B.. Spital Cot Farm, Sutton, Chester
†Burniston, Rich.. .Greenlands, Henley-on-Thames
†Burr, Daniel Higford...
Burrard, Sir George, Bt ..Walhampton, Lymington
Burrell, Bryan...Broome Park, Alnwick
†Burrell, Charles . Thetford
Burrell, J. F., jun....Manor Ho, Frimley, Farnboro'
Burrell, Robert .Palace Green, Durham
Burroughes, H N ..Burlingham Hall, Norwich
Burroughes, Rev J ...Lingwood Lodge, Norwich
Burroughes, Rev. T. ..Gazeley, Newmarket
Burroughes William.. Coltishall Hall, Norwich
Burt, Edwin. Broughton Ho., Stockbridge, Hants
Burt, Henry 6, St. Mark's Square, Regent's Park
Burton, Robert .Longnor Hall, Shrewsbury
Burtt, J B Kettering
Bury, Charles. Nazing, Essex
Busby, Henry Goodear . Moreton-in-the-Marsh
†Bush, John W Fairwood, Westbury
Bushell, T R J.. 117, Crawford St., Portman Sq
Bushell, William Poulton, Wingham, Kent
Busk, E. Thos Ford's Grove, Edmonton, Middlesex
†Busk, Joseph Codicote Lodge, Welwyn
Butcher, W Bowling Green Farm, Ewell
†Butler, The Hon C. L .Coton House, Rugby
Butler, Capt G.. Stanford Place, Faringdon, Berks
Butler, Capt J . Kirby Ho, Inkpen, Hungerford
Butler, John F.. .Childerditch Hall, Brentwood
Butler, Major Robert ..
Butler, Lieut.-Col Liphook
†Butler, Wm. Badminton, Chippenham
Butt, Henry. Kemerton, Tewkesbury
Butt, Henry.. Southgate Street, Gloucester
Butt, T Pirton Farm, Kempsey, Worcestershire
Byrd, Sampson.. The Leese Farm, Stafford
Byers, Stephen ..Chambers Farm, Epping
Bywater, R. F .. Coniston, Windermere

C

Cabrera, Gen (Ct de Morella) Wentworth, Chertsey
Cadle Clement . Billingham Hall, Ross
Cadogan, Mrs ..Brenkburn Priory, Morpeth
Caines, James Cheselborne, Dorchester, Dorset
Caird, Jas., M.P. Baldoon, Newton Stewart, N B
Calcott, Charles.. Belton, Shrewsbury
†Calcraft, J. H, M P... Kempstone, Corfe Castle
†Caldecott, Thos Rugby Lodge, Rugby, Warwicks
Caldecott, C M.. Holbrook Grange, Rugby
Caldwell, H B Lackham House, Chippenham
Caldwell, Capt. F. E... Langford Lodge, Brandon
†Caless, Wm . Bodicote House, Banbury
†Call, Sir W B., Bart ..Whitford Ho, Callington
Calverley, John.. Oulton Hall, Leeds
†Calverley, Chas C. . Teaninich Ho, Alness, N B
†Calvert, Frederic.. 9, St James's Place, S W.
Calvertt, J S . Tothill Manor House, Alford, Linc
Cambridge, W C.. Sydney Villa, Bedminster
Camden, Marquis . Wilderness Park, Seven Oaks
Cammell, Chas ...Wadesley House, Sheffield
†Cameron, A. H. F.. .Lakefield, Glen Urquhart
Camp, James . Ilfracombe
Campo, J W. del...3, Knightsbridge, S W
Campbell, A . .Auchindadroche, Lochgilphead
Campbell, R....Buscot Park, Faringdon
Campbell, Sir A T C, Bart.. Wyseby, Dumfries
Campion, Wm. J.. Danny, Hurstpierpoint
Camps, Henry. Salterley Grange, Cheltenham
Camps, Dr. Wm 40, Park St, Grosvenor Square
Cane, Edward Berwick, Lewes
Cane, Rev T. C . Southwell, Nottinghamshire
Cann, W M.. Dawlish, Devon
Canning, George H. Shottery, Stratford-on-Avon
Canning, Wm. Browne . Chisledon, Swindon
Cannon, Joseph Sims Beckley, Oxford
Cantrell, C S . Riding Court, Datchet, Windsor
Cantrell, H. . Bayliss Court Slough, Bucks
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Capel, Wm. ..The Grove, Stroud, Gloucestershire
Capron, George . Stoke, Northamptonshire
†Carew, Thomas Collipriest House, Tiverton
†Carew, W H Pole Anthony House, Devonport
Cardus, T... Barwell Court, Kingston, Surrey
Cargey, George. Sandon Hall Farm, Stafford
†Carleton, Hon and Rev R.. .Athenæum Club
†Carline, R Lincoln
Carlin, Wm, jun Marsh Cott, Keyingham, Hull
†Carnegie, David Eastbury, Watford
Carnegie Hon J J Fair Oak, Petersfield, Hants
Carr, William.. Stackhouse, Settle
Carrington, G, jun The Abbey, Great Missenden
Carroll, W. Hutchinson. .Tulla House, Nenagh
Carter, G. .Tyndales, Danbury Chelmsford
†Carter, John Bonham, M.P . Adhurst St Mary's
Carter, J R .Lanark Villa, Torquay
Carter, M. F....Newnham, Gloucester
Carter, R M ..Leeds
Carter, William Broughton, Faversham
†Cartwright, Col. H, M P. Kineton, Warwick
Cartwright, John . Craycombe House, Pershore
Cartwright, John Shrewsbury
Cartwright, Nathaniel Haugham, Louth
Cartwright, Richard Aubrey . Edgcott, Banbury
Cartwright, T R B . Aynhoe, Brackley, Northants
†Cartwright, T W Ragnall Hall, Newton, Newark
Cartwright, Col W . Weedon, Northamptonshire
Cartwright, W. S . Stow Ho, Newport, Monmouths
Carver, William Ingarsby, Leicester
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Case, Thomas H... Testerton Hall, Fakenham
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Castree, Josiah College Green, Gloucester
Catchpool, Edward Feering Bury, Kelvedon
Cater, J. W. West Lodge, Barnet
†Cathcart, Earl ..Thirsk
Cathcart, Sir John A.. Cooper's Hill, Staines
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Cator, Major-General, R.H A....Arsenal, Woolwich
†Cator, Rev T ...Wentbridge House, Pontefract
Cattley, John G ...Penshurst
†Caulfield, St. George Donamor Cas, Roscommon
Caulton, John T....Lighthorn, Warwick
Causton, Joseph.. Champion Hill, Camberwell, S.

Cave, Henry Haddon...Desborough, Kettering
Cavendish, F W. H .Ayot St. Lawrence, Welwyn
†Cavendish, Hon Capt G., R N ..Chertsey
Cavendish, Lord G H , M.P. 3, Upper Eccleston St
†Cavendish, Hon Wm G , M P Latimer, Chesham
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Cawley, Thomas Nantwich
Cawton, Wm .Somersall Hall, Chesterfield
Cayley, Sir Digby, Bart . Brompton, York
Cayley, Edward Stillingfleet .Wydale, Pickering
Cazalet, Rev W W Pinner
Chadwick, Edward Grimston Park, Tadcaster
Chadwick, E , C B . 5, MontagueVil Richmond, Sur
†Chadwick, Elias Pudleston Court, Leominster
Chadwick, T. . Wilmslow Grange, Cheshire
Chadwick, William Burlish Lodge, Stourport
†Chafy, Westwood W. Bowes House, Ongar
Chalcraft, William Bramshot House, Liphook
Chalcraft, Thomas Amory Farm, Alton
Chalk, Thomas Linton, Cambridgeshire
Challenor, John Blackwood, Leek
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Chambers, George High Green House, Sheffield
Chambers, John The Hurst, Tibshall, Alfreton
Chambers, Thomas, jun Colkirk, Fakenham
†Chambers, Wm Hafod, Rhayader
Champion, Wm W Calcot, Reading
Champneys Rev T P Snarleston, Wakefield
Chandler, Henry Salford, Manchester
Chandler, Thomas Aldbourne, Hungerford
Chandler, W B Bloomville Hall, Woodbridge
Chaplin, Frederick Taithwell Louth
Chapman, J W Mogaddy Farm, Maynooth
Chapman, Thomas 21 Westbourne Ter , Hyde Pk
Chapman, Thos 23, New Street, Spring Gardens
Chapman, William. Cornhill, Ipswich
†Charlesworth, J Headfield, Dewsbury, Yorkshire
†Charlton, St John R A College, Cirencester
†Charlton St. J C. Apley Cas., Wellington, Salop
Charlton, W H Hesleyside, Hexham
Chasemore, Philip Horsham
Chawner, Capt E Manor Ho Newton Valence, Alton
Chawner, Henry Hound Hill, Uttoxeter
Chawner, Richard Hare Hill, Doveridge, Derby
†Chawner, Richard Croft Wall, Lichfield
Cheale, Alexander, jun Uckfield, Sussex
Cheere, Rev G Papworth Hall, Caxton, Cambr
Cheere, W H Papworth Hall, Caxton Cambridge
Cheffins, Henry .Little Easton Manor, Dunmow
Cheney Edward Gadsley Hall, Melton Mowbray
Cheney, R H .Badger Hall, Shiffnall, Shropshire
Chetwode, Sir J N L., Bart Market Drayton
Chetwynde, Major W F Brocton Hall, Stafford
Chichester, Bishop of. The Palace, Chichester
Chick, John Compton Vallence, Dorset
Chick, Thomas Stratton, Dorchester, Dorset
Child, Coles The Palace, Bromley, Kent
Child, Thomas. Slinfold Horsham
Chinery, John Wootton Milton, Lymington
Chitty, Edward...Guildford, Surrey
Chivas, George Chester
†Cholmondeley, Lord H ..Holly Hill, Southampton
Chrisp, Thomas .Hawkhill, Alnwick
Christy, James, jun... Boynton Hall, Chelmsford
Chune, George Coalbrookdale, Salop
Church, John .Woodside, Hatfield
†Churchill, George . Aldershott, Fordingbridge
†Churchill, Lord .Wychwood Park, Oxon
Churchill, H Barton Ho , Morshard Bishop, Devon
†Churston, Lord Lupton, Torquay
†Churton, John . Forgate Street, Chester
Chute, W L Wiggett The Vine, Basingstoke
Clare, Charles L Higher Broughton, Manchester
Clare, W Harcourt...Twycross, Atherstone
†Clarance, John . 114, Leadenhall Street, E C.
Claridge, William P . Pitchford Park, Salop
†Clarina, Lord. Elm Park, Limerick, Ireland
†Clark, H Ellinthorpe Lodge, Boroughbridge, Yorks
Clark, Henry Berkley Square, Bristol
Clark, Rev John Crosby. Chertsey
Clark, John Wm. Lockerley, Romsey, Hants
Clark, Thomas Derndale, Hereford
Clark, William J . Rose Hill, Caversham, Oxon
Clarke, Edward . Glentworth, Lincoln
Clarke, James Carlisle
Clarke, G R Chesterton Lodge, Bicester
Clarke, Henry Binbrooke, Market Rasen
†Clarke, H. J Chapel Farm, Burley, Oakham
Clarke, John .Long Sutton
†Clarke, T E Tremlett House, Wellington, Som
Clarke, Thomas T Swakeleys, Uxbridge
Clarkson, Rev T L. South Elmham, Norfolk
†Clavering, Sir Wm. University Club, Suffolk St
Clay, Charles Walton Grange, Wakefield
†Clay, Sir W , Bart.. Fulwell Lodge, Twickenham
Clayden, Samuel Linton, Cambridgeshire
Clayden, John . Littlebury, Saffron Walden
Clayton, David S .Norbury, Stockport
Clayton, H 21, Upper Park Place, Dorset Square
Clayton, R C B. Carrigbyrne, Adamstouse, Enniscorthy
Clayton, John Newcastle-on Tyne
Clayton, John Hook, Kingston, Surrey
†Clayton, Nathaniel. Melvell Street, Lincoln
Cleasby, Thomas M Wilton Grange, Redcar
Cleave, Benjamin .Newcombe, Crediton
Clements, C. F Hesmond's Lodge, East Hothly
†Clerk, E. H. Burford, Shepton Mallet, Somersets.
Cleveland, Duke of Newton Ho , Bedale, Yorksh.
Clifford, Henry Clifford . Frampton Court, Dursley
Clifford, Col H M . Llantilio, Cosseney, Ragland
Clifford, William . 52, Parliament Street, S W.
†Clinch, Charles. Eagle Brewery, Witney
Clinton, Col Fred Ashley Clinton, Lymington
Clinton, Lord Hinton House, Crediton, Devon
†Clonbrock, Lord . Clonbrock, Ahascragh, Ireland
Clough, John . Bootham, York
†Clowes, Edmund. Carnforth, Lancaster
Clowes, George ..89, Westbourne Terrace, W.
Clowes, Wm 51, Gloucester Ter , Hyde Pk. Gard.
Clowes, Col W L Broughton Old Hall, Manch.
Clutterbuck, Rev J C Long Wittenham, Abingdon
Clutterbuck, R Watford Ho , Watford, Herts
Clutton, John 9, Whitehall Place, S W.
Clutton, Robert Hartswood, Reigate, Surrey
Clutton, Thos. C .Chorlton Hall, Malpas, Cheshire

Clutton, Wm. James...The Mount, York
†Cobb, Henry...10, Lincoln's Inn Fields
Cobb, Robert L....Higham, Rochester
Cobb, Timothy Rhodes...Banbury, Oxon
Cobb, William Henry...Colchester
Cobbett, John M....Skeynes, Edenbridge
Cobbold, John Chevallier, M.P....Ipswich
Cobden, Richard...Midhurst
Cobham, Thomas....Budleigh Salterton, Devon
Cobon, James...Well Hall, Lynn, Norfolk
Cochrane, James...Harburn, Edinburgh
Cocking, George...Crowle, Lincolnshire
†Cocks, Rev. W....Cleobury Mortimer, Salop
Cohen, Wm....Chestnuts, Figgs Marsh, Mitcham
†Coke, Hon. E. K....Longford Hall, Derby
Coldham, H. W....Anmer, Lynn, Norfolk
†Cole, R. J...11, Pembridge Gardens, Bayswater, W.
Cole, Thomas H...The Green Wick, Bath
Coleman, John...R. A. College, Cirencester
Coleman, John...Park Farm, Woburn, Beds
Coleman, Richard....Langdon Abbey, Dover
Coleman, Richard....Chelmsford
Coleman, Walter, Kingsbury Hall, Tamworth
†Coles, Alfred...Clifton Lodge, Clapham Park, S.
Coles, H. B....Middleton Ho., Whitchurch, Hants
Collin, Rev. J., jun....Rickling Vicarage, Herts
Collings, Rev. William T....Guernsey
Collingwood, E...Dissington Hall, Newc.-on-Tyne
†Collins, Henry...38, Lincoln's Inn Fields, W.C.
†Collins, John...Wonham, Bampton, Devon
Collyer, Rev. Canon R...Warham Ry., Wells, Norfolk
Colquhoun, J. C....Chartwell, Westerham
†Colyer, William...North End, Crayford, Kent
Colthurst, J. C....Huntworth Pk. Farm, Bridgwater
Colvile, Rev. A. A...Livermere Rectory, Bury St. Ed
Colvile, Major-Gen...41, Conduit Street, W.
Colvile, C. R., M.P...Lullington Ha., Burton-on-Tr.
†Colvin, B. B....Waltham Abbey, Essex
Combermere, Visc.. Combermere Abbey, Nantwich
†Compton, H. C., M P....Lyndhurst, Hants
†Compton, R....Eddington House, Hungerford
†Condie, James...Perth
†Congreve, S. B....Harbors Magna, Rugby
†Congreve, T ...Leamington Hastings, Rugby
†Congreve, W....Comb Fields, Brinklow, Coventry
Constable, Rev. J....R. A. College, Cirencester
Conway, Wm. S....Bodryddan, St. Asaph's, Flintsh.
Cooch, Joshua...Harleston, Northampton
Cook, George...Flitwick, Ampthill
†Cook, John...Hothorpe, Welford, Northamptonsh.
Cooke, Grimwood....Linton, Cambridgeshire
†Cooke, Henry...High Street, Hereford
Cooke, James H....Berkeley Castle, Gloucestershire
Cooke, Rev. James Y....Semer, Hadleigh, Suffolk
Cooke, Robert C....Livermere, Bury St. Edmund's
Cooke, William, C.E....26, Spring Gardens, S.W.
†Cooke, Wm. Fothergill...Eliot Ho., Blackheath
Cookson, John...Meldon Park, Morpeth
Coombs, T....South Street, Dorchester, Dorset
Cooper, Edward...Henley-in-Arden
Cooper, G. Kersey...Euston, Thetford
Cooper, Isaac...Long Brackland, Bury St. Edmund's
Cooper, John...Swineshead Hedse, Spalding
Cooper, Jonathan...Barton, Bury St. Edmund's
†Cooper, N. J....Westgate, Mansfield
†Coote, E. (11th Hussars)..West Pk., Fordingbridge
Copeman, George...Dunham Lodge, Swaffham
Copeman, Robert, jun....Hemsley, Great Yarmouth
Copestake, Thos. G....Kirk Langley, Derby
†Coppard, Thomas...Horsham
Corbet, Dryden R....Sundorne Castle, Shrewsbury
Corbet, H....Farmer's Club, Bridge St., Blackfriars
†Corbet, H. R....Adderley Hall, Market Drayton
†Corderoy, Edward...Clapham Park, S.
Corfield, W....Butteley Hayes, Audlem
Corner, Edward...Esk Hall Whitby
Corner, J. B....Longforth, Wellington, Somerset
Corner, Richard...Torweston, Williton, Taunton
Cornes, James...Barbridge, Nantwich
Cornewall, Sir V., Bart....Moccas Court, Hereford
Corrance, F....Parham Hall, Wickham Market
Corringham, R W....Gringley, Bawtry
Coryton, Augustus...Pentillio Castle, Cornwall
Cosens, William...Langdon Dawlish, Devon
Cotes, Rev. C. G...Stanton St. Quintin, Chippenham
Cother, William...Middle Aston, Woodstock
†Cotta, Baron G....Hipfelhof, Heilbronn, Germany
Cottam, George H....Old St. Pancras Road, N.W.
Cotterell, Jacob Henry...6, Terrace Walks, Bath
Cottingham, John G....Chesterfield, Derbyshire
†Cotton, Alexander...
Cotton, H....Amor Hall, Washbrook, Ipswich
Cotton, H. P....Thornborough, Bucks
†Cotton, Lt.-Col. Hon. W. H. S....Malpas, Cheshire
†Couchman, C....Temple, Balsall, Birmingham
Couchman, J. W....Tottenham Green, Middlesex
Coulson, Col...Blenkinsopp, Haltwhistle, Northum.
†Coulthard, G....Stone House, Haybon, Carlisle
Coulton, William...Dean Court, Ashburton
Counsell, William...
Coupland, John G....Freeston, Boston
Coupland, J....Southampton
†Court, P. Simpson...140, Snargate Street, Dover
Courthorpe, G. C....Whyly, Lamberhurst, Sussex
Coussmaker, Lannoy...Westwood, Farnham, Surrey
Coverdale, John...4, Bedford Row, W.C.
Cox, Capt. C. J....Fordwich House, Canterbury
†Cox, Henry...Trevereux, Edenbridge, Kent
Cox, Joseph...Wisbeach
Cox, Samuel Walker...Breadsall, Derby
Cox, William...Brailsford, Derby
Cox, Wm. Thos....Cottage, Spondon, Derby
†Coxe, James...Newtown Lodge, Hungerford
Coxon, John...Treeford Farm, Lichfield
Coyney, C...Weston Coyney, Newcastle-under-Lyne
Cradock, Thomas...Quorndon, Loughborough
Crane, Edward...Forton, Montford, Shrewsbury
Crane, James...Tolpuddle, Dorchester
Crane, James...Shrawardine, Salop
Crawford, Rev. W. H....Haughley Park, Woolpit
Crawford, Wm. H....Lakelands, Cork
†Crawley, John...Stockwood Park, Luton
Creese, William...Teddington, Tewkesbury
Cresswell, Gerard O....Ashwicken, King's Lynn
Cresswell, R. W....Ravenstone, Ashby-de-la-Zouch
Cresswell, Robert...Idridgehay, Wirksworth

Cresswell, A. J. Baker...Cresswell, Morpeth
†Crisp, Thomas...Butley Abbey, Wickham Market
Crisp, Arthur William...Chillesford, Woodbridge
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Croft, Archdeacon J., M.A....Saltwood, Hythe, Kent
Croft, Sir J., Bart., F.R.S....52, Queen Ann St., W.
†Crofton, Lord...Mote Park, Athlone, Ireland
†Crofts, Rev. C. D....Caythorpe Rectory, Grantham
Crofts, John...Long Lawford Hill, Rugby
Crofts, T. W....Lawford Hill, Rugby
Crompton, G....6, Drayton Gr., Old Brompton, S.W.
Crompton, George...Chesterfield
Croome, James...Breadstone, Berkeley, Gloucester.
Creeta, G. H....Crooke, North Tawton, Devon
Crosbie, Wm. T....Ardfert Abbey, Tralee, Ireland
†Cross, Wm. A....Red Scar, Preston, Lancashire
Crosse, Thomas B....Shaw Hill, Chorley
Crosskey, John...Lewes
Crosskill, William, Trustees of...Beverley
Crosskill, Alfred...The Iron Works, Beverley
Crosthwaite, John...Much Wootton, Liverpool
†Crow, G....Ornhams, Boroughbridge, Yorkshire
Crowley, John L....Standford Hall, Newport, Salop
Croxon, John...Llanoorda, Oswestry
†Crump, G. W....Woollas Hill, Eckington, Pershore
Crump, Thomas...Whitefield, Tewkesbury
Crundwell, George...Wilton Place, Maidstone
Cruso, John...Leek, Staffordshire
Crutchley, P. H....Sunninghill Park, Staines
Cubitt, Wm., (Lord Mayor)...Andover
Cuff, J. H....New Cattle Market, Islington, N.
†Cuff, W. Fitchett...Merriott, Ilminster
Culley, John...Easton, Pewsey, Wilts
Culverwell, Jas....Wedmore, Weston-super-Mare
Cumberbatch, L....Queen's House, Lyndhurst
†Cumming, L....Ratten, Thurso, N. B.
Cuninghame, John...Hensol, Castle Douglas, N. B.
†Cure, Capel...Blake Hall, Ongar, Essex
Cureton, George...Bean House, Shrewsbury
Currie, Edmund...Adbury House, Newbury
Currie, Henry...West Horsley Park, Leatherhead
Currie, James...Hillside, Watford, Herts
Currie, Raikes...4, Hyde Park Terrace, W.
Curtis, Capt. C....Pailton House, Lutterworth
Curtis, E....Dunmow Grange, Basingstoke
†Curtis, Sir Wm., Bart....Caynham Court, Ludlow
Curtler, T. G....Bevere House, Worcester
Cust, Capt. F. Henry...Ellesmere
Cust, Leopold...Tipperary
Custance, Hambleton F....Weston House, Norwich
Cuthbert, Robert...Newton-le-Willows, Bedale
†Cuthbert, William...Beaufront, Hexham

D.

Dacre, Lord...The Hoo, Welwyn, Herts
†Dacre, Joseph...Kirklinton Hall, Carlisle
Dalgairns, William...Rosaire, Guernsey
Dalton, Thomas...Cardiff
Damen, Robert...Dorchester
Daniel, John W....Goton Park, Burton-on-Trent
Daniel, Thomas...Stoodley, Tiverton
†Daniel, Thos. D....Stuckeridge, Bampton
†Darbishire, S. D....Pendyffryn, Conway
Darby, George...Marklye, Warbleton, Hurst Green
†Darby, Abraham...Stoke Court, Slough
Dare, F. M. Hall...Carlton Club, S.W.
Dare, R. W. Hall...Newtownbarry, Ireland
Darley, Chas. Albert...Burtonfield, York
Darling, Charles...The Hall, Langham, Colchester
†Darling, J....Beau Desert, Rugeley
Darnbrough, Thos. S....27, Coney Street, York
Darvill, Henry...Windsor
Dashwood, Francis...Halcot, Bexley, Kent
†Dashwood, F. Loftus...Kirtlington Park,
Dashwood, Henry W....Kirtlington, Oxford
†Dashwood, M....9, Seymour Place, Mayfair, W.
Daubeny, Edmund...Clive House, Bristol
Daubeny, Rev. E. A....Ampney, Cirencester
Daubeny, R....King's Bench Walk, Temple, E.C.
Davey, George....Buckland, Faringdon, Berks
Davey, Richard, M.P....Redruth, Cornwall
David, Edward...St. John's Place, Hereford
David, Evan...Fairwater, Cardiff
Davie, Sir H. Ferguson, Bart....Creedy, Crediton
Davies, D. R....Mere Old Hall, Knutsford
Davies, Rev. J....Moor Court, Herefordshire
Davies, Rev. R. T....Crickhowell, Brecknockshire
Davies, Richard...Aylestone Hill, Hereford
Davies, Robert C....Clifton Ville, Hove
†Davies, Robt. P....Ridgeway, Narbeth, S. Wales
Davies, Rev. S...The Grange, Oystermouth, Swansea
Davies, Mrs Susanna...Rochlaveston Manor, Notts
Davies, Thomas...Burlton Court, Barghill, Hereford
Davies, Wm. Kevill...Croft Castle, Leominster
Davis, Cornelius B....Maple Ho., Highclere, Hants
Davis, Henry...Old Downs, Oakhill, Bath
†Davis, John...Cranbrook, Ilford, E.
Davis, Peter...Bickmarsh Hall, Alcester
†Davis, R....9, St. Helen's Place, Bishopsgate, E.C.
†Davis, R. F....19, Gloucester Gardens, Hyde Park
†Davis, Samuel...Swerford Park, Enstone, Oxon
Davis, James...Melcombe Horsey, Blandford.
Davis, T....Little Wenlock, Wellington, Shropshire
†Davis, Thomas Henry...Orleton, Worcester
Davison, Thomas...Durham
Davey, Jas....Fitton-Barton, South Molton
Davey, J. S....Redruth, Cornwall
Davy, John T....Barton Roseash, South Molton
Davy, Robert...Ringwood, Hampshire
Dawes, John S....Smethwick House, Birmingham
Dawkins, E. H. F....Moggerhanger Ho., St. Neot's
Dawson, Edward...Aldcliffe Hall, Lancaster
Dawson, J....Gronant, Rhyl, Flintshire, N. W.
Dawson, J....Blair Hill Mains, Culross, N. B.
†Dawson, Wm. Edward..Plumstead Common, Kent.
Day, Charles...Colleyweston, Stamford
Day, Francis...Priory, St. Neot's, Hunts
Day, John...Newick Lodge, Uckfield, Sussex
Deacon, John...Mabledon, Tonbridge
†Dean, A. K....East Brent, Axbridge, Somerset
†Dean, F. K....East Brent, Axbridge, Somerset
Deane, F. H....Eastcot, Ruislip, Watford
Deane, Rev. Henry...Gillingham, Dorset
Deane, William Anthony...Webbery Ho., Bideford

Dearden, James...Poole
†De Cursay, Visct...Château de Cursay, Lusignan
Deedes, Major G....Hillhurst Farm, Hythe
Deedes, William, M.P....Sandling Park, Hythe
De L'Isle Dudley, Lord...Penshurst Park, Kent
Dell, Thos...Broadway Farm, Great Berkhampstead
Delves, William...Frant, Tonbridge Wells
De Mauley, Lord...Down Ampney, Cirencester
†Demidoff, Prince...Florence
†Denbigh, Earl of...Newnham Paddock, Lutterworth
Denchfield, J....Aston Abbotts, Aylesbury
Denison, Edmund...Doncaster
†Denison, Sir W., Bart....New South Wales
Denison, W. Beckett...Burley, Leeds
Denman, Arnold...Stoneham, Lewes
Denman, Lord...Middleton Hall, Bakewell
Denne, Wm....Three Counties Asylum, Baldock
†Dennett, Mullens...Lodsworth, Petworth, Sussex
Dennis, John Chas....Rosebrough, Northumberland
Dennis, Robert...Greetham, Horncastle
Denson, Samuel...Picton Hall, Chester
Dent, Joseph...Ribstone Hall, Wetherby
Dent, Joseph...Neasham Hall Farm, Darlington
Dent, John D., M.P....Ribstone Hall, Wetherby
Dent, Ralph...Streatlam Castle, Barnard Castle
De Rothschild, Sir A., Bt....Aston Clinton, Tring
De Salis, Rev. H. J....Fringford Rectory, Bicester
†De Trafford, Sir H., Bt...Trafford Pk., Manchester
Devas, Charles F....Bromley Lodge, Kent
Devas, Horace...Alvaston Field, Derby
Devas, Thomas...Dulwich, Surrey, S.
Devas, William...Woodside, Old Windsor
Deverell, John...Purbrook Park, Portsmouth
Des Voeux, Henry...Drakelow Pk., Burton-on-Trent
†De Vitre, H. D....Purchase Manor, Ditchling
Devon, Earl of...Powderham Castle, Exeter
Dew, Tomkyns...Whitney Court, Hereford
Dewar, William...Middleton, Bicester
†De Wezele, Count G....
Dewhurst, George...Brown Street, Manchester
†Dewing, R...Carbrooke, Watton, Norfolk
De Winton, J. P....21, Burton St., Eaton Sq., S.W.
De Winton, Capt. T....Walsworth Hall, Gloucester
Dicken, Thomas...Colton Hall, Rugeley
†Dickens, Charles Scrace...Horsham
Dickin, John...The Lodge, Chirk
Dickinson, W. F. D....Ulverston, Lancashire
Dickins, R. A...Woodford Grange, Wolverhampton
Dickinson, H....Severn Ho., Coalbrook Dale, Salop
†Dickinson, E. H....King's Weston, Somerton
Dickinson, John...Havercroft, Cockermouth
Dickinson, John...Abbott's Hill, Watford, Herts
Dickinson, William...New Park, Lymington
†Dickens, Thomas...High Oakham, Mansfield
Dickson, James...Chester
Dickson, Wm....East Wickham, Welling, Kent
Digby, Lord...Minterne House, Dorchester, Dorset
Digby, Rev. K...Tittleshall Rectory, Litcham, Norf.
Digby, Lt.-Col. R...6, Chapel St., Grosvenor Sq., W.
†Dilke, C. Wentworth...76, Sloane Street, S.W.
Dilke, C. W....76, Sloane Street, S.W.
†Dilke, Charles W....76, Sloane Street, S.W.
†Dillon, Viscount...Dytchley Hall,

†Dinning, J...Adderstone, Belford, Northumberland
Disraeli, Rt.Hn. B., M.P...Hughenden Man., Bucks
†Divett, Edward, M.P....Bystock, Exmouth, Devon
Divett, John...Bovey Tracey, Devon
Dix, George Weatherstone...Howden, Yorkshire
Dixon, Henry...Frankham, Tunbridge Wells
Dixon, Hugh...5, India Buildings, Liverpool
Dixon, Isaiah...Grove Terrace, Leeds
Dixon, John...Harmston, Lincoln
Dixon, J. T....Dunterley, Bellingham, Northumb.
†Dixon, John W....Beesby, North Thoresby, Louth
Dixon, Peter...Holme Eden, Carlisle
Dixon, Thos. John...Holton, Caistor, Lincolnshire
†Dixon, Thos. Parkinson...Caistor, Lincolnshire
Dixon, Wm. F....Page Hall, Sheffield
Dobson, Samuel...Cardiff
Docker, Ludford...Paul's Hill, Leigh, Tunbridge
Dod, J. W., M.P....Cloverley, Whitchurch, Shrops.
†Dod, Whitehall...Brynduinarth, Conway
†Dodson, Charles E....Littledale Hall, Lancaster
Dods, T. P....Anick Grange, Hexham
Dodwell, J....Manor House, Long Crendon, Oxon
Doggett, Thomas William...Sandon, Royston
Dolphin, T....Swafield, North Walsham, Norfolk
Donald, W....St. James's Hall, Regent Street, W.
†Donovan, George (49th Regt.)...
Donovan, J. C....Gatwick, Mill Hill, Billericay
Dorrington, C....Bridehall Farm, St. Albans
Dormer, C. Cottrill...Rousham, Woodstock, Oxon
†Dorrien, C....Ashdean, Funtington, Chichester
Doubleday, E....Long Clawton, Melton Mowbray
Douglas, James...Athelstaneford, Drem, N. B.
Dowden, Thomas...Roke Farm, Bere Regis
Dowding, Edwyn...15, Vineyards, Bath
Downs, Henry...Manor House, Basingstoke
Downs, J. H....Grove Lodge, Fulham
Dowson, B....Quay, Yarmouth
Downward, Rev. George R....Shrewsbury
Drake, Sir T. T. F. E., Bart...Nutwell Court, Exeter
Drake, T. Tyrwhitt...Shardloes, Amersham
Drakeford, David...Dillions, Crawley, Sussex
†Drax, J. S. W. Erle, M.P....Blandford, Dorsetshire
Dray, William...Farningham, Kent
Drew, Henry...Peamore, Exeter
†Drewe, E. Simcoe...The Grange, Honiton
†Drewitt, George...Manor Farm, Oving, Chichester
Drewitt, Henry...Milvill Farm, Titchfield
Drewitt, John...North Stoke, Arundel
†Drewitt, R. Dawtrey...Burpham, Arundel
Drewitt, Thomas...Piccard's Farm, Guildford
Drewry, George...Holker House, Cartmell, Lanc.
Drinkrow, John Wm....Tibthorpe House, Driffield
†Driver, George Neale...5, Whitehall, S.W.
†Druce, Joseph...Eynsham, Oxford
†Druce, Samuel...Eynsham, Oxford
†Drummond, A. R....Cadland, New Forest, Hants
Drummond, Dr. H...15, Westbourne Ter., Hyde Pk.
Ducane, Chas., M.P....Braxted Lodge, Witham
Duckham, T....Baysham Court, Ross, Herefordshire
†Duckworth, Sir J., Bart....Wear House, Exeter
†Duckworth, Russell...Dirleton, Drem, N. B.
Duffield, James...Great Baddow, Chelmsford
Dugdale, W. Douglas...West Chaldon, Dorchester

Duke, Henry...Barnley, Chichester
Duke, Henry...Burleston, Dorchester, Dorset
Dumbrell, James, jun....Ditchling, Sussex
Duncan, W. G....Bradwell House, Stony Stratford
†Duncombe, Hon. O....Waresley Pk., Biggleswade
Duncombe, Sir P. P., Bart....Bletchley, Bucks
†Dun, Finlay...Weston Park, Shipston-on-Stour
Dunn, Gen., R.E....Denford House, Hungerford
†Dunn, Thomas...1, York Gate, Regent's Park, W.
†Dunne, Thomas, jun....Bircher, Leominster
Duplessis, Jules...Newton Park, Lymington
Duppa, T. D....Longville, Shrewsbury
Du Pré, C. G., M.P....Wilton Park, Beaconsfield
Dupuis, Rev G.J...Creeting Rect., Needham Market.
Durant, Richard...Sharpham, Devon
Durham, Makin...Thorne, Yorkshire
Dyer, George...Wey House, Alton
Dyke, Sir P. H....Lullington Castle, Dartford, Kent
†Dyke, Rev. T. H...Long Newton, Stockton-on-Tees
Dyne, F. Bradley...4, Suffolk Street, Pall Mall East
Dyott, Col...:Freeford Manor, Lichfield

E.

Eardley, Sir C. E., Bart....Belvedere, Erith, Kent
Eardley, R ...Norton-in-Hales, Market Drayton
East, Sir Gilbert W....Hall Place, Maidenhead
†Easthope, Sir John, Bart.. Fir Grove, Weybridge
†Easton, James...Nest House, Gateshead
Easton, James.. Grove, Southwark, S E
Eastwood, R....Townley Brimshaw, Burnley
Eaton, Charles A....Tixover Hall, Stamford
†Eaton, George. .Spixworth, Norwich
Eccles, Joseph...Mill Hill House, Blackburn
Eckley, Richard...12, Darlington Place, Bath
†Eddison, Edwin....Headingley Hill, Leeds
†Eddison, Francis...Adel Mill, Leeds
†Eddison, R. W....Headingley Hill, Leeds
†Eddison, William...Huddersfield
Edelsten, P....The Woodlands, Moseley, Birming.
†Eden, J....Beamish Pk., Chester-le-Street, Durham
Eden, R....Bevington Green Ho., Hemel Hempstead
Edge, Davis...Outhill, Studley, Warwickshire
†Edge, James Thomas...Strelly Hall, Nottingham
†Edmonds, F. Eask....Berryfield Ho, Bradford, Wilts
Edmonds, R....Trunkwell House, Reading
Edmondson, John...Grassyard Hall, Lancaster
Edmunds, Edmund...Rugby
Edwards, Francis...Bulstrode Park, Bucks
Edwards, Frederick...Barnham, Thetford
Edwards, Frederick...Pilbreath, Carmarthen
Edwards, Henry N....Broadwood, Leominster
Edwards, James L....Rochester, Kent
Edwards, Joseph...Hutton, Weston-super-Mare
Edwards, Joseph Priestley.. Fixby Park, Halifax
Edwards, Peter Norman. .Brinsop Court, Hereford
Edwards, Robert V...Shottisham Hall, Woodbridge
†Edwards, Thomas....Wintercott, Leominster
Egerton, Sir P. de M. G., Bt M.P....Tarporley
Egerton, Lord...Tatton Park, Knutsford
Eggar, James...Binsted, Alton
Egginton, S. H....North Ferriby, Brough, Yorkshire

†Eland, S. E...Manor Ho., Stanwick, Higham Ferrers
Elcho, Lord, M.P....Armisfield, Haddington, N.B.
Eley, Charles...Beavers Farm, Hounslow, W.
Eley, Wm. H., jun....Cobham, Gravesend
Elkington, George R....Pembrey, Llanelly
Elkington, H....Woodbrook, Northfield, Birming.
†Elkins, J. N.. Elkington, Welford, Northamptonsh.
†Elliot, John...Chapel Brampton, Northampton
Ellis, Charles...Franklands, Hurstpierpoint
Ellis, Job...Oswestry
†Ellis, John...Arlington, Guildford
Ellis, I. P....The Field, Hampton Bishop, Hereford
Ellis, Robert Ridge...Yalding, Kent
Ellison, Charles...Oldbury Lodge, Bridgnorth
Ellison, Henry...Stone, Tickhill, Rotherham
Elliston, B. A ...Croydon Arrington, Cambridge
Ellman, R. H....Landport, Lewes
Ellman, Thomas...Beddingham, Lewes
Elmhirst, Rev. E....Shawell Rectory, Rugby
Elmsall, Mansfeldt de C....The Club, York
Elorza, General da Francisco...Tubia, Oviedo
†Elston, Capt. W....St Ann's Rd, North Brixton, S.
Elton, Sir E. M., Bt....Widworthy Court, Honiton
Elton, Major Robert James...Whitestanton, Taunton
Elvidge, Benjamin...Leven, Beverley
Elwes, John H....Closeburn House, Cheltenham
Emson, H. H....Nether Hall, Cherry Hinton, Camb.
†Enfield, Viscount...Wrotham Park, Barnet
England, Richard...Binham, Wells, Norfolk
Enniskillen, Earl of....Florence Court, Fermanagh
Ensor, John ..Dorchester, Dorset
Enys, John Samuel...Enys, Penryn, Cornwall
Epton, W. M....Langton Wragby, Lincolnshire
†Erkoig, Adolphus...Derekegyhaza, Pesth, Hungary
†Erle, Rev. Christ....Hardwicke, Aylesbury
Erle, Rt. Hon. Sir W., Kt ..Bramshot Grange, Liphook
Ernest, Henry...4, Whitehall, S W.
†Errington, Rowland...Sandon, Hexham
Esdaile, W. C. D... Burley Park, Ringwood, Hants
†Estcourt, E. D. B....Charlton House, Tetbury
Etches, Wm....Beech House, Newcastle, Staffs.
Ethelstone, Rev. C. W....Up Lyme, Lyme Regis
†Euston, Earl of...Euston, Thetford
Evans, E M....Llynbarried, Nantmel, Kington
Evans, Edward...Boveney Court, Windsor
Evans, George...Wimborne, Dorset
Evans, Henry J....[illegible], Cardiff
Evans, Isaac Pearson...Griff, Nuneaton
Evans, James Eaton...Haverfordwest
Evans, John...Uffington, Salop
Evans, R. P....Orpines, Wateringbury, Maidstone
†Evans, R. W....Eyton Hall, Leominster
Evans, Samuel...Darly Abbey, Derby
Evans, Thos. M...19, Queen's Rd. W., Regent's Pk.
Evans, Capt. T. B....Deane House, Easton, [illegible]
†Evans, Rev. W. E....Burton Court, Herefordshire
Everington, William, jun....Skegness, Boston
†Everington, Wm. D....Plumstead House, Norwich
Everitt, James...North Creake, Fakenham
Evershed, John....Albury, Guildford
Ewings, William...29, Russell Square, W. C.
Exall, W....Kates Grove Works, Reading, Berks
Exley, Wm. H....Wisbeach, Cambridgeshire

Eyke, John...Stanton, Shifnal
†Eyre, G. E....Warrens, Stoney Cross, Southampton
Eyre, Henry R....Shaw House, Newbury
Eyre, Martin...17, Bellevue Terrace, Leeds
Eyre, R. T....Bartley, Totton Wear, Southampton
†Eyres, Capt. Harry...Knockwood Park, Tenterden
Eyton, John Wynne...Lee's Wood, Mold, Flintshire
†Eyton, Thos. C....Vineyard, Wellington, Shropsh.
Eyton, William...Gonsall, Shrewsbury

F.

Faber, C. Wilson...Northaw House, Barnet
Fair, J....Warton Lodge, Lytham, Preston, Lancas.
Fairbairn, George...Holmes Chapel, Cheshire
Faithful, Rev. G. D....Lower Heyford, Woodstock
Falmouth, Viscount...Mereworth Castle, Maidstone
Fane, Cecil...4, Upper Brook Street, W.
†Fardon, H. F....The Firs, Bromsgrove
†Farhall, J. N....Tillington, Petworth
Farley, Rev. C. Turner...Moorhall, Stourport
†Farmer, Archibald H....Harefield, Cheam, S.
Farmer, Edward...Fazeley, Staffordshire
Farnworth, J. K....Alderley Edge, Manchester
Farnham, E. B.....Quorndon House, Loughborough
†Farr, Wm. Wyndham...Iford, Christchurch, Hants
†Farrer, Edmund...Sporle, Swaffham
Farrer, James...Ingleborough, Settle
†Farrer, O. W....1, Hamilton Place, Piccadilly, W.
Farthing, Walter...Stowey Court, Bridgwater
Faulkner, C. F. A....Bury Barnes, Burford, Oxon
Faulkner, John...Bretby Farm, Burton-on-Trent
Faviell, [illegible]Brown...Stockwell Park, Wetherby
†Faviell, Mark, jun....
Faviell, William Fred....Down Place, Guildford
Fawcett, John...Durham
Fawcett, W....Burton Salmon, Milford Junction
Fawkes, F. H. ..Farnley Hall, Otley
Featherstone, Wm....Sunley Hall, Kirby-Moorside
Feilden, Captain H. M....Bank Hall, Clitheroe
Feilden, J....Wilton House, Blackburn
Feetham, John...Great Burdon, Darlington
†Fellowes, Jas....29, Gloucester Place, Portman Sq.
Fellowes, Robert... Bitteswell Hall, Lutterworth
Fellowes, Rev. T. L....Beighton Rectory, Acle
Fellows, W. Manning...Or[illegible]by, Great Yarmouth
†Felton, Clement...Dunto[illegible]akenham
Fenn, George...Beccles
Fenton, John T....Waterloo Colliery, Leeds
†Ferard, Charles Colton...Ascot Place, Windsor
Ferrabee, Jas...Phœnix Ironworks, Stroud, Gloucest.
†Ferris, T....Manningford Bohune, Pewsey, Wilts
†Ferris, William...Draycot, Pewsey, Wiltshire
Festing, R. G....1, Queen Sq. Place, Westminster
Ffooks, Thomas...Sherborne
†Ffoulkes, John J. (Maj.)...Llandyssil, Shrewsbury
Fiddes, Thomas F....Towneley Lodge, Burnley
†Field, Henry...Tulse Hill, S.
Field, James Pope...Shi[illegible]-on-Cherwell, Oxford
†Field, William...224, Oxford Street, W.
Field, William David...Swan Hill, Shrewsbury
†Fielden, Joshua...Stansfield Hall, Todmorden
†Fielden, S....Centre Vale, Todmorden
Fieldsend, C., jun....Kirmond, Binbrook, Lincolnsh.
Filliter, George...Trigon Hill, Wareham, Dorset
Filmer, Sir E., Bt., M.P....East Sutton Pk., Maidstone
†Finch, Hn. Mj.-Gn. J., C.B...Castle, Berkhampstead
Finch, J....1, Adelaide Place, London Bridge, E.C.
†Finch, Rev. W....Warboys, Huntingdonshire
†Findlay, John...Garnstone, Hereford
Finlay, Alex. J....Castle Toward, Greenock
†Finnis, Steriker...The Elms, Hougham, Dover
Firth, Samuel...Burley Wood, Leeds
Firth, William...Burley Wood, Leeds
Fisher, Cuthbert J....Huntleys, Tunbridge Wells
Fison, Cornell...Thetford
†Fison, John Petterton...Horningsea, Cambs.
†Fitzgerald, H. T. G....St. Mary's Vicarage, Reading
Fitzgerald, Wm. Seymour....Hollbrook, Horsham
Fitzherbert, William...Somersal Herbert, Uttoxeter
†Fitzhugh, Thomas Lloyd ..Plas Power, Wrexham
Fitzhugh, Rev. Wm... Street, Lewes
Fitzpatrick, Rt. Hon. J. W....Granstown, Ireland
Fitzroy, Lt.Col. H....Sennowe Lodge, Guiest, Norfk.
Fitzroy, George...Grafton-Regis, Stony Stratford
Fitwilliam, Hon. C. H....Alwalton, Peterborough
Fitzwilliams, E. C. L....Newcastle Emlyn, S. W.
Fletcher, Alexander...Red House, Southampton
†Fletcher, Lt.-Col. E. C... Kenward, Yalding
Fletcher, George...Shipton, Cheltenham
Fletcher, John Charles...Dale Park, Arundel
†Fletcher, J.P....Ashley Park, Walton-on-Thames
Fletcher, William...Radmanthwait,
Flower, G. F. A...Lewell Farm, Dorchester, Dorset
Floyd, Thomas.. Frilford, Abingdon
Flover, John...Hints, Tamworth
†Floyer, John...Stafford, Dorchester, Dorsetshire
Floyer, John Wadham...Martin, Horncastle
Foden, John...Mere, Knutsford
†Foljambe, Geo. Saville...Osberton House, Worksop
Folkestone, Viscount...Longford Castle, Salisbury
Fookes, H....Whitechurch Farm, Blandford
Forbes, Sir J. S., Bart....Pitsligo, Fettercairn, N. B.
Ford, Charles Ingram...Abbeyfield, Sandbach
Ford, J., jun....Rushton Farm, Blandford
Fordham, Edward King...Ashwell, Baldock
Fordham, John George...Royston
Forester, G. T....Ercall Magna, Wellington, Shrops.
Forester, Rev. R.T....Arthur's Club, St. James's
Forrest, Thomas...Spurston Hall, Tarporley
Forrester, George...Tombland, Norwich
†Forrester, Jos. James...24, Crutched Friars, E.C.
Forster, R. C....White House, Gateshead
Forster, Robert...Tottenham Green, Middlesex
†Forster, Samuel...Southend, Sydenham
Forsyth, James...Sorne House, Tobermary, Argylls.
Fort, George...Alderbury House, Salisbury
Fortescue, Hon. G....Boconnock, Lostwithiel, Cornw.
Foster, Edward...Waterton Hall, Goole, Yorkshire
Foster, J....Ledsham, Milford Junction
Foster, J. P....Bolton House, Seven Sisters Road, N.
†Foster, John James...Mansion Street, Lincoln
†Foster, Richard...Castle, Lostwithiel, Cornwall
Foster, Wm....Canwick House, Lincoln
†Foster, William...Stourton Court, Stourbridge

†Foster, W. O., M.P....Stourton Castle, Stourbridge
Fothergill, James...Beeston, Nottingham
Fothergill, John...Nottingham
Fothergill, Matthew...Cefmachder, Newport, Mon.
Fothergill, R....Hensol Castle, Cowbridge, S.Wales
Fowle, W....Market Lavington, Wiltshire
Fowler, Benj....Whitefriars Street, Fleet Street, E.C.
Fowler, Charles...Whitelands, Bicester
Fowler, John K., jun....Aylesbury
Fowler, M ...Little Bushy Farm, Stanmore, N.W.
†Fowler, R.C....Gunton Hall, Lowestoft
Fowler, R., jun....14, Bennett's Hill, Birmingham
Fowler, Francis...Henlow, Baldock
Fowlie, Wm....Red House, Hursley, Winchester
Fox, Alfred Lloyd...Manure Works, Penrhyn
†Fox, G. Lane...Bramham Park, Tadcaster
†Fox, Chas. B....Malpas, Newport, Monmouthshire
Fox, Frederick F...Melbourne, Derby
Fox, Robert...Falconhurst, Cowden, Kent
Fox, W....Elfordleigh, Plympton St. Mary, Devon
Fox, William...Dunston, Sleaford
Frampton, Henry...Okers Wood, Dorchester, Dorset
Francis, Clement (Solicitor)...Cambridge
Francis, Frederick...Warley Place, Brentwood
Francis, S. R. G....Cranham Place, North Ockendon
Franklin, Edward L ...Ascott, Wallingford
Franklin, John...Ewelme, Wallingford
†Franklin, Richard...Clemenstone, Bridgend
Franklin, Robert...The Park, Thaxted
Franks, George...Thong, Gravesend
Franks, James...Bramley, Guildford
Fraser, Hugh...Culloden, Inverness
Frederick, Sir R...Burwood Pk., Walton-on-Thames
†Freebody, Wm. Yates...9, Duke St., Westminster
Freeman, John Gardner...Rockfield, Hereford
Freeman, Thos....Henham Wangford
Freeman, W. P. W....49, Welbeck Street, W.
Freestone, T....Irthlingborough, Wellingborough
French, Richard Day...St. John's, Bungay
†Frere, G. E....
Frere, P. H....Regent Street, Cambridge
Frogley, Ralph Allen...Hounslow, W.
†Frost, Chas....Wherstead, Ipswich
Frost, Edward...West Wratting Hall, Linton
†Fry, James Thomas...Boston, Bromley, Kent
Fry, Thomas...Baglake Farm, Dorchester, Dorset
Fryer, W. Fleming...The Wergs, Wolverhampton
†Fryer, W. R....South Lytchett House, Poole
Fulcher, Thomas...Elmham Hall, Thetford
†Fulford, Baldwin...261, High Street, Exeter
Fulljames, Thos ...Hatfield Court, Gloucester
Fulshaw, Richard...Bushby House, Leicester
Fulton, Hamilton Henry...4, Victoria Street, S.W.
Furniss, Lawr....Birchill Farm, Baslow, Chesterfield
Furnival, S....Napeley Heath, Market Drayton
Fussell, Rev. James G. C....Chantry, Frome
†Fytche, J. Lewis...Thorpe Hall, Elkington, Louth

G.

Gadesden, Augustus W....Leigh House, Tooting, S.
Gaisford, Major T....Raystone, Chipping Sodbury
Gale, Chas. J....Kilnocks, Botley, Hants
Galpin, George...Kingston Farm, Dorchester
Galpin, John...Dorchester, Dorset
†Galton, Darwin...Claverdon Leys, Warwick
†Galway, Viscount, M.P....Serlby Hall, Bawtry
†Gamble, D....Gerard's Bridge St Helen's, Lanc.
Gamble, Thomas . Canwick Road, Lincoln
†Gamlen, Wm. H....Hayne House, Tiverton
†Gammie, Geo....Shotover House, Wheatley, Oxon
Gandy, Lt.-Col ...Heaves, Milnthorpe
Garbatt, Thomas...Yarm, Cleveland
†Gard, R. Sommers...Rougemont House, Exeter
Garde, T....Ballinacurra, Midleton, co. Cork
Gardner, Francis...Ryburgh, Fakenham
Gardner, William Nettleton...Wells, Norfolk
Gardner, Capt. T....Sea View, Ryde, Isle of Wight
†Gardon, T. W....The Yeld, Baslow, Bakewell
Garmston, John...Worcester
†Garne, John...Filkens, Lechdade
†Garne, Robert...Aldsworth, Northleach
†Garne, Wm....Kilkenny Farm, Bibury, Fairford
Garnett, William...Clitheroe
Garnett, W. J., M.P ...Bleasdale Tower, Garstang
Garrard, C. B. D....Lamar Hall, St. Alban's
†Garratt, John, jun....Bishop's Court, Exeter
Garrett, Richard...Carlton Hall, Saxmundham
Garrold, R. H....Kilforge, Ross
Garsed, John...The Moorlands, Cowbridge
Garth, Rev. Richard...Farnham, Surrey
Garth, T. C....Hains Hill, Reading, Berkshire
Gascoyne, Wm....Bapchild Court, Sittingbourne
Gascoyne, William Whitehead...Sittingbourne
†Gaskell, Henry L....Kiddington Hall, Woodstock
†Gatacre, Edward L....Coton, Kidderminster
Gater, John...West End, Southampton
Gates, John...Grindle Hall, Shiffnall
Gates, John A....Grange Farm, Sapiston, Ixworth
†Gates, R ...7, Sussex Place, Horsham
Gatrell, William Verling...Lymington, Hampshire
Gatty, George...Felbridge, East Grinstead
Gaudern, J....Earl's Barton, Wellingborough
Gauntlett, Wm. H....Middlesborough-on-Tees
†Gauthorp, Henry...Moorfield House, Widnes
†Gawne, Edw. Moore...Kentraugh, Isle of Man
†Geary, Sir W. R. P., Bt....Oxen Heath, Tunbridge
Gedge, Johnson...Bury St. Edmund's
Gee, Thomas...Brothertoft, Boston
Geldard, Chris., jun....Cappleside, Settle
Gelderd, George A....Aikrig End, Kendal
George, T. Willington...Bellevue House, Leeds
†German, George...Measham Lodge, Atherstone
Gervis, Sir G. E. M. T., Bt....Christchurch, Hants
Gibb, John...
Gibbon, A...Staunton, Coleford, Gloucestershire
Gibbens, Edward...Minster, Isle of Thanet
Gibbons, Stephen...Brocklesby Park, Ulceby
†Gibbs, George...Belmont, Bristol
Gibbs, Robert...Carhampton, Dunster
Gibbs, Thomas...24, Down Street, Piccadilly, W.
Gibbs, W....Alverston Hill, Stratford-upon-Avon
Gibbs, Wm....Tyntesfield Bourton, Bristol
Giblett, John...Lower Clapton, N.E.
Gilbert, Henry...Barnby Manor, Newark, Notts
Gilbert, James...22, Anne Street, Birmingham

†Gilbert, R....Ashby Hall, Berghapton, Norfolk
†Gilbert, Thomas W....The Close, Salisbury
†Gilbert, William A ...Cantley, Acle
Gilbertson, M....Elm Cottage, Egham Hill, Surrey
Gill, George...Weston, Shrewsbury
Gill, Joseph...Leeds
Gillett, John...Fawler, Charlbury
Gillett, John...Minster Lovel, Witney
Gillett, Thomas...Kilkenny, Faringdon
Gilpin-Brown, G...Sodbury Park, Richmond, Yorks.
Ginders, Samuel...Ingestrie, Stafford
Giraud, Edward...Preston, Wingham
Girdwood, John...49, Pall Mall, S.W.
†Gladstone, Capt.,M.P....Bowden Pk.,Chippenham
Glaisier, William Richard...41, Charing Cross, S.W.
Glegg, J. B....Withington Hall, Chelford, Congleton
Glegg, Capt. E. Holt...Backford Hall, Chester
Glen, G....Stratton Audley Park, Bicester
†Glendining, Alexander...Ash Grove, Sevenoaks
Glenton, Frederick...Bensham, Newcastle-on-Tyne
Glover, John...Bangley, Tamworth
Glover, Robert...Wexford, Lichfield
Glynne, Rev. Henry...Hawarden Rectory, Chester
Glynne, Sir S , Bt., M.P...Hawarden Castle, Flintsh.
†Goblett, John...Sudbourne, Woodbridge, Suffolk
Goddard, H. N...Manor Ho., Cliffe, Wootton-Bassett
Goddard, Thomas...St. Fagans, Cardiff
Goddard, Wm. Gilbert...Broad Chalk, Salisbury
†Goddard, William R ...Somerset House, W.C.
Godwin, William...Lugwardine, Hereford
Goggs, James...Great Baddow Park, Chelmsford
†Goldhawk, R., jun ...Hasle Hall, Steer, Guildford
Goldsmith, Thomas...Dairy Farm, Ixworth
Gomm, Gen. Sir W. M....New St., Spring Gardens
†Gonne, Charles...Warley Lodge, Brentwood
Gooch, John Kerr...East Tuttenham, Norwich
†Gooch, John Virel...Reform Club, Pall Mall, S.W.
Gooch, Stephen...Honingham, Norwich
Goode, H. Phelps...Haverfordwest, Pembrokeshire
†Goodden, John...Over Compton, Sherborne, Dorset
Goodenough, J....Godmanstone, Dorchester, Dorset
†Goodhart, Charles E....Langley, Beckenham
†Goodlake, F. Mills...Wadley Ho., Faringdon
Goodson, Wm....Hill Farm, Mitcham, S.
Goodwin, J....1, Turret Pl , Rectory Grove, Clapham
Goold, R. W....3, Adelphi Terrace, W.C.
Gordon, Charles...Heavitree, [illegible]eter
Gordon, R....Kemble House, [illegible]rencester
Gosford, Vincent...Tan-y-llan, Holywell, Flintshire
Gosling, John...Brewery, Bocking, Essex
Gosling, Robt...Hassobury, Bishop's Stortford, Herts
Gosling, Thomas G....15, Portland Place, W.
†Gosset, Capt. Arthur...Eltham, Kent
Goucher, John...Woodsetts, Worksop
Gough, Edward...Gravell Hill, Shrewsbury
Gould, John...Hyde Hall, Denton, Manchester
Gould, Rev. Joseph...Hurst Green
Gouldbourne, Joseph...Wilkesley, Whitchurch
Goulding, Wm....108, Patrick Street, Cork
Gouthwaite, Richard...Lumby, Milford Junction
†Gow, James...Fowler's Park, Hawkhurst, Kent
†Gower, A. L....Castle Malgwyn, Newcastle Emlyn
Gower, Andrew...Market Drayton
†Gower, Erasmus...Clynderwen, Narbeth, S.W.
†Gower, J. Leveson...Gonver, Alverstoke, Gosport
†Gower, Robt. F....Clynderwen, Narbeth, S.W.
Graburn, R. S....Mells, Frome, Somerset
Grace, Wm....Newbiggin, Morpeth
Graham, Alexander...Kirkhill, Stirling, N.B.
†Graham, James...Curtle House, Southampton
Graham, Walter...West Drayton, Uxbridge
Graham, William, jun....Abingdon
Grain, Peter, jun....Shelford, Cambridge
Grant, Henry I....Wormley Bury, Hoddesdon
Grant, William...Litchborough, Weedon
Grantham, George...Barcombe Place, Lewes
Grantham, Rev. Thos....Bramber, Steyning
†Granville, Earl...Aldenham, Bridgnorth
Graves, Septimus Perry...Mayfield, Sussex
Graves, Robert...Charlton, Shaftesbury
†Gratwick, W. G K....Ham, Arundel
Gray, Rev. John D....Abbotsley Vicarage, St. Neot's
Gray, Jonathan...Sion Hill, Bath
Gray, William...Kingston, Drem, N.B.
Grazebrook, George...The Race Course, Stourbridge
Greaves, Edward, M.P ...Barford, Warwick
Greaves, William...Bakewell, Derbyshire
Green, Rev. G.W...Court Henry, Dryslwyn, Carmar.
Green, John...Knipton, Grantham
Green, Joseph B....Marlow, Leintwardine
Green, Richard...Metheringham, Sleaford
Green, Richard...Knighton, Radnorshire
Green, Robert...Milford House, Derby
Green, Rev. Thomas...Vicar of Badby, Daventry
†Greenall, G., M.P....Walton Hall, Warrington, Lanc
Greene, E....West Gate, Bury St. Edmund's
†Greene, Harry A....Crown Street, St. Ives, Hunts.
†Greene, Thomas...Whittington Hall, Lancaster
Greene, Wm...Takeley, Little Canfield, Chelmsf.
Greene, Wm....Ditcham Park, Petersfield
Greenwood, Charles...Wallingford, Berkshire
†Greenwood, Fred....Norton Conyers, Ripon
†Greenwood, J., M.P....Swarcliffe Hall, Ripley
Greenwood, R....Towse Ho., Ludford, Market Rasen
Greetham, Thomas...Stainfield Hall, Lincolnshire
Greetham, William...Stainfield Hall, Wragby
Gregg, James...Ledbury
†Gregg, Thomas...
†Gregor, Gordon W.F...Trewarthewick, Grampound
Gregory, George...Crowhurst, Battle
Gregory, J....Shavington Park, Market Drayton
Gregory, J. S....Bramcote Hills, Nottingham
Gregson, Brian Paget...Caton, Lancaster
†Gregson, Mathew...Toxteth Park, Liverpool
Grenfell, Chas. P., M.P....38, Belgrave Sq., S.W.
Grenfell, Riversdale W....Ray Lodge, Maidenhead
†Grenville, Ralph N....Butleigh Ct., Glastonbury
Greswell, Dan....Louth
Greville, Col. Fulke S....North Mims Park, Hatfield
†Grey, Rt. Hon. Sir G., Bt., M.P...Fallowdon, Alnwick.
†Grey, Hon. Brow. N, Osborn De...Watton, Norfolk
†Grey, Capt. Hon. F. W., R.N....Howick, Alnwick
†Grey, Hon. & Rev. F. De...Copdock Recty., Ipswich
†Grey, Hon. G. De...11, South Audley Street, W.
Grey, Jas....Kimmerston, Wooler, Northumberland
Grey, John...Dilston House, Gateshead

†Griffin, A. W....Pell Wall Hall, Market Drayton
Griffin, Edward...Towersey, Thame
Griffin, John...Borough Fenn, Peterborough
Griffin, Fred. C....Methwold, Brandon, Norfolk
Griffith, C. Darby...Padworth House, Reading
Griffith, Edw. H....Plas-Newydd, Trefnant, Rhyl
Griffith, J...Llwyndurls, Newcastle-Emlyn
Griffith, Samuel Y....Star Hotel, Oxford
Griffithes, Thomas J....Bishop's Castle, Salop
Griffiths, Edward...New Court, Hereford
Griffiths, John...The Weir, Hereford
†Grissell, Thos...Norbury Park, Mickleham, Surrey
†Grisewood, H....Daylesford Ho., Chipping Norton
Grosvenor, Earl, M.P ...28, Princes Gate, S.W.
Grove, James...Great Baddow, Chelmsford
Grove, Philip...Eastcoate, Towcester
Groves, Thomas...Plompton Hall, Knaresborough
Grundy, E. S....Reddish Hall, Lymm, Warrington
Grundy, J....The Dales, Stand, Manchester
Grylls, Capt. Glynn...Waterhouse Exbridge
Gubbins, John Panton...Rhual, Mold
Guilding, Richard...Malvern Wells
Gulston, Alan James...Woodland Castle, Swansea
Gunner, William...Will Hall, Alton
†Gunter, Captain Robert...Wetherby
†Gurdon, J. B....Assington Hall, Boxford
†Gurdon, Bramp....Letton Hall, Shipdham, Norfolk
†Gurdon, Rev. P....Cramworth Rectory, Shipdham
†Gurdon-Rebow, J., M.P...Wivenhoe Pk, Colchester
†Gurdon, William...Brantham, Manningtree
†Gurney, John Henry, M.P....Easton, Norwich
Gurney, Russell...8, Palace Gardens, Hyde Park, W.
†Guthrie, John...Guthrie Castle, Forfarshire
Gwyn, H., M.P....Dyffryn, Neath, Glamorganshire
Gwyn, Rich. H....Astbury Hall, Bridgnorth, Salop
Gwyn, Wm. Edw....Plas Cwrt Hyrs, Carmarthen
Gyles, John...Apleyhead, East Retford, Notts

H.

Hack, James Carter...Springfield, Chelmsford
Hacker, John Heathcote...Leek, Staffordshire
Hadden, A....The Old Parks, Ashby-de-la-Zouch
Hagen, Jacob...Ropley House, Alresford
Haggard, Wm. M. R....Bradenham Hall, Thetford
Hagger, Franklin...Hertford
Haig, J. H....Highfields Park, Wythiham, Sussex
Haigh, George...Erdington, Birmingham
Haines, Edward...Moorwood House, Cirencester
Hale, Chas. C....Glenlochay, Killrie, Perthshire
Hales, Edward...North Frith, Hadlow, Kent
Halford, Thos....Kerry, Newtown, Montgomerysh.
Halford, T....Newbold-on-Stour, Shipton-on-Stour
Halkett, Rev. D....Rector of Little Bookham, Surrey
Halkett, Peter Alexr....142, High Holborn, W.C.
Hall, Alexander Hall...Watergate, Emsworth
Hall, Benjamin...Wood Farm, Malvern Wells
Hall, Collinson...Navestock, Romford
Hall, Francis...Park Hall, Mansfield
Hall, George...Garford, Yarkhill, Ledbury
†Hall, Henry...Halliford Green, Middlesex
†Hall, Henry...Barton, Woodstock
Hall, Henry...Alton
Hall, James...Scorborough Hall, Beverley
†Hall, John...Wiseton, Bawtry
Hall, J.O....1, Brunswick Row, Queen's Sq., Blooms.
Hall, John...Sibthorpe, Newark-on Trent
Hall, Major-Gen....Carlton Club, Pall Mall, S.W.
Hall, John...Arnold Lodge, Nottingham
†Hall, Marshall...Blacklands Park, Calne, Wilts
Hall, Richard...Raglan House, Neath, Glamorgansh.
Hall, T....Duke's Oak, Brereton, Congleton
Hall, Thomas K....Holly Bush, Burton-on-Trent
†Hall, William...Ashton, Leominster
Hallam, John...Newcastle, Staffordshire
Hallam, Thos....Bridlesmith Gate, Nottingham
Hallett, Fred. Fran....The Manor House, Brighton
Hallowes, Thomas...Glasswell Hall, Chesterfield
†Halls, Joseph...Denham Hall, Bury St. Edmund's
•†Halliday, J ...Chapel Cleeve, Taunton
Halliday, Thomas C....Red Hill, Barstow, Horley
Halse, J. C....Pulworthy, Molland, South Molton
Halse, Philip...Molland, South Molton
Halsey, Rev. J. F. Moore...Hemel Hempstead
Halsey, Thomas...Compton House, Newent
Halsted, Thomas...Woodcote, Chichester
Halton, Rev. Immanuel...Winfield Manor, Alfreton
†Hambro, Charles...Milton Abbey, Blandford
†Hambrough, Albert J....Steep Hill Castle, Ventnor
Hamersley, Hugh...Great Haseley, Tetsworth
†Hamilton, Capt. Archibald...Rozelle, near Ayre
Hamilton, Chas. W....Hamwood, Dunboyne, Ireland
†Hamilton, John...Sundrum, Ayr, N.B.
†Hamilton, Wm. M ...2, Orchard Place, Canterbury
Hammerton, Charles...Princethorpe, Warwickshire
Hammond, Horace John...Chapel Farm, Eltham
†Hamond, W. Parker...Pampisford Hall, Cambridge
Hanbury, E....Eastrop, Highworth
Hanbury, Rev. G....Swaffham
Hanbury, Robert...Poles, Ware, Herts
Hancock, Abraham...Little Grove, Ropley, Alresford
Hancock, J. Donne...Halse, Taunton
Hancock, T....Staplefield Common, Crawley, Sussex.
Hand, James...Ludlow, Shropshire
†Handley, Maj. Benj....Folkingham, Lincolnshire
Handy, Edward...Sireford, Cheltenham
Hanmer, Col. H....Stockgrove, Leighton Buzzard
Hanmer, Sir J., Bt., M.P...Bettisfield Pk., Whitchurch
Hannam, Charles...Northbourne Court, Deal
Hannam, Henry J...[illegible]cote, Abingdon
Harbin, George...Newton House, Yeovil
†Harcourt, G. Granville, M.P....Nuneham Pk., Oxford
Harcourt, Admiral Octavius...Swinton Park, Bedale
†Hardacre, Richard...Hellifield, Leeds
Hardcastle, J. A., M.P....Writtle
†Hardcastle, Jonathan...Blidworth Dale, Mansfield
Harding, Egerton W....Old Springs, Market Drayton
Harding, George...Durweston, Blandford, Dorset
†Harding, John...Dursley, Gloucestershire
Harding, James...Waterson, Dorchester, Dorsetshire
Harding, S. T....Stinsford Farm, Dorchester, Dorset
Harding, Wm. C....Lower Winchendon, Aylesbury
Hardinge, Edm....Bounds Park, Tonbridge Wells
Hardwick, Alfred...Hangleton, Shoreham
Hardy, James...Jaques Hall, Manningtree
†Hardy, John...Dunstall Hall, Burton-on-Trent

†Hardy, W H. C....Letheringsett Hall, Holt, Norfolk
Hare, Humphrey John...Docking Hall, Norfolk
Hare, Joseph...Wilton Farm, Beaconsfield
†Hare, Sir J., Bart....18, Pall Mall East, S.W.
Hare, Sir Thos., Bart....Downham Market, Norfolk
Harewood, Earl of...Harewood House, Leeds
†Harford, J. B....Stoke House, Stoke Bishop, Bristol
†Harford, John Scandrett...Blaise Castle, Bristol
†Harford, W....Barley Wood, Wrington, Bristol
Harker, James...Tibshelf, Alfreton
Harker, Rev. Wm....Vicarage, Pulloxhill, Ampthill
Harkes, William...Lostock, Knutsford
Harland, W. C....Sutton Hall, York
†Harman, Hon. L. K....Ballymena, Ireland
Harper, Latimer...Chilton Cottage, Hungerford
Harries, Francis, jun....Cruckton Hall, Shrewsbury
Harrington, Earl of...Elvaston Castle, Derbyshire
Harris, James...Long Sutton, Odiham
Harris, John...Springfield, Bedford
†Harris, Lord...Belmont, Faversham
Harris, Richard...Wootton Grange, Northampton
Harrison, John...Summerlands, Kendal
Harrison, J., jun...Snelston Hall, Ashbourne, Derbys.
Harrison, J., jun... Heaton Norris, Stockport
Harrison, J. T..Frocester Court, Stonehouse, Glouc.
†Harrison, Richard...Wolverton, Stony Stratford
Harrison, Rev. R. J...Carr Howell, Montgomery
Harrison, Rev. J H....Bugbrooke Rectory, Weedon
Harrison, William H...Oxendon, Northamptonsh.
Harrowby, Earl of...Norton Ho., Campden, Glouces.
Hart, Henry P....Beddingham, Lewes
Hart, John George...Stowmarket
Hart, Thomas...Ascott, Leighton Buzzard
†Harter, Rev. G. G....Cranfield, Newport Pagnell
†Harter, Jas. Collier...Broughton Hall Manchester
Hartley, Gilferd Wm....Rose Hill, Whitehaven
Hartshorn, Thomas...Silkmore House, Stafford
Harvey, Chas W....Royal Bank Buildings, Liverpool
Harvey, Edw N....Mount Ho, Hythe, Southampton
Harvey, Matthew...Balderton, Newark, Notts
†Harvey, Richard...Greenaway, Torquay
Haslam, Charles...Basingstoke
Haslar, Richard...Aldingbourne, Chichester
Hastings, John...Longham, East Dereham
Hassall, Wm....Babney, Whitchurch, Salop
Hatfield, Chas. Taddy...Ha[illegible]own House, Margate
Hatfield, Thomas...St. Mar[illegible] Stamford
Havers, William...Bacon's Farm, Mountnessing
Harward, John..Chaddesley Corbet, Kidderminster
Haward, R....Mells Hill, Halesworth
Hawarden, Viscount...Dundrum Castle, Cashel
Hawkesley, Archibald...Englefield Green, Surrey
†Hawkesworth, R. S...Forest, Mountrath, Ireland
Hawkins, H. M...Tredunnock, Usk, Monmouthsh.
†Hawkins, T....Smallbridge, Bures St. Mary, Suffolk
Hawks, George...Gateshead Iron Works, Gateshead
Hawthorn, W...Benwell Cottage, Newcastle-on-Tyne
Hay, C. Anderson...17, York Ter., Regent's Pk., W.
Hay, G. W...Sudbury, Derbyshire
Hay, J....Bishopthorpe, Great Grimsby
Haydon, Samuel...Guildford
Hayes, Henry...Stamford
Hayes, John Higson...Frodsham
Hayne, John...24, Gloucester Sq., Hyde Park, W.
Hayne, Col. Richard...
Hayter, Tom John...West Woodgates, Salisbury
Hayward, H. S...Folkington, Willingdon, Sussex
Hayward, Chas....Dartmouth Grange, Dartmouth
Hayward, J. Curtis...Quedgeley House, Gloucester
Haywood, Henry...Blakemere House, Hereford
Hazlerigg, Sir A. Grey, Bt....Noseley Hall, Leicester
Head, William Alston...East Grinstead
Headlam, Morley...Whorlton, Darlington
†Heale, H. Newton...Highfield, Hemel Hempstead
Healey, Edward Charles...163, Strand, W.C.
Heaps, Christopher...Leeds
Heard, Wm...St. Margaret's, Ware
Heasman, Alfred...Angmering, Arundel
Heath, Douglas D....Kitlands, Dorking
Heath, R....Hefferstone, Weaverham, Northwich
†Heathcote, Capt. Eustace...Blanshard Lyndhurst
†Heathcote, J. M....Connington Cas., Stilton, Hunts.
Heathcote, Richard...Bayterby, Atherstone
Heaton, Thomas...Alton, Cheadle
Heaword, Joseph...Wood Villa, Reddish, Stockport
Hegan, Joseph...Liverpool
Hellier, Thos. Shaw...Rodb[illegible]n Hall, Penkridge
†Hellyer, G. W. M....India
Helps, Richard...1, Barton Street, Gloucester
Helyar, Wm. Hawker...26, Manchester Sq., W.C.
Hemming, Wm....Coldicott, Moreton-in-the-Marsh
†Hempson, John A....Erwarton Hall, Ipswich
†Hemsley, John...Shelton, Newark, Notts
Henderson, John...Felderland, Sandwich
Hendy, James...Trenouth, Grampound
Heneage, Geo. H. Walker...Compton Basset, Calne
†Henley, Rt. Hon J. W., M.P....Waterperry, Oxon
Henly, T. L....Calne, Wilts
Henn, T. Rice...Paradise House, Kildysart, Clare
†Henning, James...Wolveton, Dorchester, Dorset
Henning, Wm L....Frome Ho, Dorchester, Dorset
Henry, Frederick H....Lodge Park, Straffan, Ireland
Henry, Capt. James...Blackdown House, Petworth
Henton, Samuel...7, Bridge Street, Lambeth, S.
Hepworth, Joshua...Rogerthorp, Pontefract
†Herbert, John Maurice...Rocklands, Ross
Hercy, John...Cruchfield House, Maidenhead
Herrick, Wm. Perry...Beau Manor Park, Loughboro'
†Herries, Lord...Everingham Park, Pocklington
Hersee, Dennett...Wepham, Chichester
†Hertefeld, The Baron de...Liebenberg, Berlin
†Heseltine, E....Blackheath Park, Kent
†Hester, G. P....Town Clerk's Office, Oxford
Hetherington, Robt....Manor Ho., Ropley, Alresford
Hewer, John B., jun....Vern House, Hereford
Hewer, William...Hill Farm, Northleach
Hewer, Wm....Sevenhampton, Highworth, Wilts
Hews, R. S....
Hext, Thomas...Trenarren, St. Austell
†Heytesbury, Lord...Heytesbury, Wilts
†Heywood, Sir Benj., Bt....Claremont, Manchester
†Heywood, J....26, Palace Gardens, Kensington, W.
Heywood, Wm. H...Dunham Massey, Altrincham
†Hibbert, John...Braywick Lodge, Maidenhead
†Hibbert, Washington...Bilton Grange, Rugby
Hickin, John...Bourton, Rugby

Hicks, Leonard...Paddock Lodge, Kentish Town
Hickman, Capt. W. T....Woodlands, Welling, Kent
†Hicks, William G....Halstead, Sevenoaks
Hickson, Richard...Hougham, Grantham
Higginbotham, Samuel...Castlemilk, Glasgow
Higgins, H....Woolaston Grange, Lydney, Gloucest.
Higgins, Thos....Lower Binton, Stratford-on-Avon
Higgins, Wm. B. Cole...Pict's Hill, Bedford
†Higginson, Edmund...Saltmarsh, Bromyard
Hilder, John...Sandhurst, Kent
Hill, Lord Edwin...Norwood Park, Southwell, Notts
Hill, Charles....West Hoathley, East Grimstead
Hill, Hon. T. H. Noel...Berrington, Shrewsbury
Hill, Col. C. J....Cotgrave Place, Nottingham
Hill, Rev. Copinger...Buxhall, Stowmarket
Hill, Rev. J....The Citadel, Hawkston, Shrewsbury
Hill, Richard...Golding Hall, Shrewsbury
Hillman, John, jun....Stoneham, Lewes
Hilton, George...South Hanningfield, Chelmsford
Hilton, Henry...Sole St. Hou., Selling, Faversham
Hilton, Stephen Musgrave...Brambling, Wingham
Hilton, Capt. Thos....Nackington Ho., Canterbury
Hincks, T. C....Brackenboro', Thirsk
†Hinde, J. H....Acton House, Felton, Northumb.
Hippisley, John...Lamborne Place, Hungerford
†Hipwell, G. M....Cheam, Surrey
Hitch, Saml., M.D. ..Sandywell Park, Cheltenham
Hitchcock, H....Chitterne, All Saints, Heytesbury
Hitchings, Frederick...Havant, Hants
Hitchman, John, M.D....Mickleover, Derby
Hobbs, Charles...Maisey Hampton, Cricklade
Hobbs, William...Derward's Hall, Bocking, Essex
Hobson, A....Kilkea, Castle Dermot, Kildare
Hobson, John George...Long Sutton
Hocking, John...Bude, Cornwall
Hodding, Matthias Thos....Salisbury
Hodge, Henry...St. Levan, Penzance
Hodgkinson, Enoch...Morton Grange, Retford
Hodgkinson, Rev. G. C....The Lodge, Louth
Hodgkinson, Richard...Osberton Grange, Worksop
Hodgson, Isaac Scott...Sodyll Hall, Ruabon
†Hodgson, William...Gilston Park, Herts
Hodgson, William...Grimston, Tadcaster
Hoggins, Thomas...Trafford Lodge, Chester
Holbech, Rev. Chas. Wm....Farnborough, Banbury
Holborow, Daniel...Knockdown, Tetbury
Holcombe, Rev. G. F....Sherwood Lodge, Nottingham
Holding, Henry...Fardington, Alton
Hole, James...Knowle, Dunster, Somersetshire
Hole, William...Hannaford, Barnstaple
†Holland, Dr Chas....Lyncroft House, Lichfield
Holland, C....Madeley Pk. Farm, Newcastle, Staffs.
Holland, S., jun....Plas y Penrhyn, Port Madoc, Carn.
Holliday, James...Lord street, Liverpool
Hollier, Amos...Lindley Grange, Hinckley
†Hollist, Hester...Lodsworth, Petworth
Holloway, Horatio...Marchwood, Southampton
Holloway, Thos....Tittenhurst Lodge, Sunninghill
†Holloway, H. de B....Bunorva, Nakel, Prussia
Holmes, George...Brooke Lodge, Norwich
Holmes, Rev. John...Brooke Hall, Norwich
J....Prospect Place, Glebe Lane, Norwich]

Holroyd, Fred....Knowles Fixby, Huddersfield
Holton, George...Wiston, Sudbury
Home, James K....Church Stretton, Salop
Home, Thomas, jun....Moreton-in-the-Marsh
Homer, John G....Martinstown Dorchester
†Hony, Rev. P. F....25, Old Bond Street, W.
Honywood, William...
†Hood, Alex. A....St. Audries, Bicknoller, Taunton
Hood, Hon. Col. A. N...Cumberland Lodge, Windsor
Hooper, Geo...Cottington Court, Deal
Hope, Joseph.. Whoof House, Carlisle
Hope, Edwardes Thos. Hen... Moore Park, Ludlow
Hope, Sam. Pierce...Betley Hall, Newcastle, Staff.
†Hopkins, Henry...Burnside, Van Diemen's Land
Hopkins, John...Tidmarsh House, Reading
Hopkinson, John...Manton, Worksop
Hopper, W. Cuthbert...Beaumont Castle, Lancaster
Hopton, Rev John...Canon-Frome Court, Ledbury
Hopton, Rev. Wm. P....Bishop's Frome, Bromyard
†Horley, Thomas, jun....The Fosse, Leamington
†Hornby, Rev. Robt....Lythwood Hall, Shrewsbury
Hornby, Rev. W....St. Michael's Vicarage, Garstang
Hornby, Capt. W., R.N....Knowsley Cott., Prescott
Horncastle, J., jun....Edwinstowe, Ollerton
†Horner, James B....Lincoln
Horner, Rev John...Mells Park, Frome, Somerset
Horner, Wm , Hamel's Farm, Puckeridge, Ware
Horniblow, William T....Ripple, Tewkesbury
Hornsby, Richard...Spittle Gate, Grantham
Hornsby, Richard, jun...Spittle Gate, Grantham
Hornyold, J. V....Blackmore Park, Upton-on-Severn
Horsfall, Thos....Burley Hall, Otley
Horton, Richard...Audley End, Saffron Walden
Horton, Thomas. .Harnage Grange Cressage, Salop
†Horton, Wm. Thomas...Embsay Kirk, Skipton
Horwood, Matthew...2, Hatton Ct., Threadneedle St.
†Hoskins, Thos....Haselbury, Crewkerne, Somerset.
†Hoskins, William....North Perrott, Crewkerne
†Houblon, J. A....Hallingbury Pl , Bishop's Stortfd.
†Houblon, Richard Archer...Coopersale, Epping
Howard, Hon. C. W. G., M.P ...Brampton
†Howard, Charles...Biddenham, Bedford
†Howard, Henry...Greystoke Castle, Penrith
†Howard, Hon. James...Hazelby, Newbury
†Howard, James...Bedford
Howard, Robert S....Broughton Hall, Wrexham
Howard, Wm....Wind[illegible] Terrace, Taunton
Howden, Alexander...Murston Court, Pembridge
Howell, John...Ewen, Cirencester
Howes, E., M P....Morningthorpe, Long Stratton
Howlett, John...Bowthorpe Hall, Norwich
†Hubback, Joseph...Liverpool
†Hubbard, Wm. Egerton...St. Leonard's, Horsham
Hubbersty, Rev. N...Eastwell Hall, Melton Mowbray
Hubie, Robert...Barlby Grove, Selby
Hudson, John...Castleacre Lodge, Brandon
†Hudson, T. Moore...Castleacre, Brandon
Hudson, Thos....Adderley, Market Drayton
Huggup, James...West Sleekburn, Morpeth
Hughes, Alfred...Thorness, W Cowes, Isle of Wight
†Hughes, H R...Kinmel Pk., St. Asaph's, Denbighsh.
†Hughes, Hugh...Woodgate, Danehill, Uckfield

Hughes, Hugh Robt.…Ystrade, Denbigh
Hughes, Samuel…14, Park St., Westminster, S.W.
Hulme, J. H..Cliff House, Curbar, Baslow, Derbysh.
Hulme, W.…Pembroke Bank, Pembroke, S. Wales
†Hulse, Charles…Hall Grove, Bagshot
Humberston, P. S., M.P.…Mollington, Chester
Humble, William Turner…Sealand, Chester
Humfry, Wm.…Oak Ash, Chaddleworth, Wantage
Humphreys, H.…Beau Manor Pk. Farm, Loughboro'
Humphries, E …Pershore
Humphries, John…Twining, Tewkesbury
†Hunt, G.…Frenchwood, Preston, Lancashire
Hunt, John…Shirley, Southampton
Hunt, John…Rainham, Rougham, Norfolk
Hunt, Joseph…Addlethorpe House, Boston
Hunt, Thomas…Thornington, Coldstream
Hunt, William…Leicester
Hunter, Hen. Launoy…Beech Hill, Reading
Hunstman, Benjamin.. West Retford, Notts
Hurle, Joseph Cooke…Brislington, Bath
Hurlston, Wm …Heathcote, Wasperton, Warwicksh.
Hurrell, William…Newton, Cambridge
Hurt, Francis…Alderwasley, Belper
†Huskinson, Thos.…Epperstone, Southwell, Notts
Hussey, Edward…Scotney Castle, Lamberhurst
Hussey, Phineas Fowke…Wyrley Grove, Walsall
†Hussey, Rich. Hussey…Upwood, Huntingdon
Hussey, T.…Steed Farm, Skirmett, High Wycombe
Hussey, Thomas…Alphington, Exeter
Hutchings, Rev. R S.…Monkton Wyld, Charmouth
†Hutchison, John…Monyruy, Peterhead, N. B
Hutchinson, Hon. Col H. K…Weston Ho., Towcester
Hutley, Jonathan.. Rivenhall Hall, Witham
Hutt, John…Water Eaton, Oxford
Hutton, Thomas…Upton Gray, Odiham
Hutton, Timothy…Clifton Castle, Bedale
Hutton, William…Gate Burton, Gainsborough
Huxtable, Rev. A.…Sutton Waldron, Blandford
†Huyshe, Rev. J.…Clysthydon Rectory, Collumpton
Hyde, Francis Colville…Lyndale, Feversham
Hyett, John Edw.…Haydon's Elm, Cheltenham
Hyett, W. H.…Painswick, Gloucestershire

I.

Ide, John…West Wittering, Chichester
Ilbert, W. Roope…Hoswell Ho., Kingsbridge, Devon
Iles, Daniel…Fairford Retreat, Fairford
†Iles, Francis…Barnoldby-le-Beck, Grimsby
Iles, John…Binbrook Hill, Market Rasen
Inge, Chas. Henry…Whittington Hurst, Lichfield
Inge, Col. Wm.…Thorpe, Tamworth
Ingham, Robert…Westor, South Shields
Ingram, Hugh…Steyning, Hurstpierpoint
Ingram, Hugo F. M.…Hoarcross, Rugeley, Staffords.
†Ingram, John A ..Codford St. Peter, Warminster
†Ingram, Joseph…Wigan
Ingram, William…Armley, Leeds
Insole, James Harvey…Ely Court, Llandaff
†Ireland, J. Ireland Clayfield…Brislington, Bristol
Ireland, John Smith…Forthampton, Tewkesbury
Isaacson, John…Clare, Suffolk
Isaacson, Wm. Parr…Newmarket
Isham, Sir C. E., Bart…Lamport Hall, Northampton
Isham, Rev. R.…Lamport Rectory, Northampton
Isherwood, A. Salisbury…Marple Hall, Stockport
Ives, Capt. Ferdinand..St. Catherine's Hill, Norwich
Izon, John B.…Walsgrave on-Sowe, Coventry

J.

Jackson, Matthew…Bilsthorpe, Newark, Notts
Jackson, Daniel…Chadwell Place, Grays, Essex
Jackson, P. R…Blackbrook, Grosmont, Hereford
Jackson, Richard…Noctorum, Birkenhead
Jackson, Thomas…Eltham Park, Kent
†Jackson, William…Oak Bank, Carlisle
Jackson, Wm. Kay…Barbot Hall, Rotherham
Jacson, Chas. Roger…Barton, Preston, Lancashire
Jaggard, Joseph…Leek Wooton, Warwick
James, Edward…Wylam Hall, Newcastle-on-Tyne
James, Isaac…Tivoli, Cheltenham
James, Jas.…North Sodston, Narbeth, Pembroksh.
James, James William…Mappowder, Blandford
James, J. A..Bridge Touro Farm, Stratford-on-Avon
James, Richard…High Street, Haverfordwest
James, Richard…Llanrwst
James, T.…Otterburn Tower, Newcastle-on-Tyne
James, Sir Walter C., Bt.…Betteshanger, Sandwich
†James, Capt. Wm. E.…Barrock Lodge, Carlisle
†Jarrett, John…Camerton House, Bath
Jarvis, Sir R.…Cove Cottage, Ventnor, Isle of Wight
Jarvis, T. A.…Higher Bolberry, Kingsbridge, Devon
†Jay, John…46, West Seventeenth St., New York
Jecks, Charles…Thorpe, Norwich
Jefferson, Henry…Rothersyke, Whitehaven
Jefferson, Rev. J. Dunnington..Thicket Priory, York
†Jefferson, Robert…Preston Hows, Whitehaven
Jefferys, N. N..Hollybrook Ho., Shirley, Southamp.
Jeggo, Thos. B.…Mounts, Great Saling, Braintree
Jekyll, J… Carholme Terrace, Newland, Lincoln
Jekyll, Edw. J, jun.…Bramley House, Guildford
Jenkins, Richard David…The Priory, Cardigan
Jenkinson, Joseph…Millwick, Stone, Staffordshire
Jenner, Montague Herbert…Chislehurst, Kent
Jennings, Richard…Carmarthen
Jervis, Hon. C. Swinfen…Aston Park, Staffordsh.
†Jervoise, F. E. J.…Herriard Park, Basingstoke
Jessop, Joseph…Grove Farm, Chiswick
Jobez, Charles…17, Boulevard Madeleine, Paris
Jobling, Edward…Hill Top Cottage, Carlisle
Johnson, A. H.…Manor House, Acton, Middlesex
Johnson, A. H., jun.…Hanger Hill Farm, Ealing
Johnson, Charles W.…155, Fenchurch Street, E.C.
Johnson, Cuthbert Wm.…Waldronhurst, Croydon
Johnson, Edward…The Deanery, Chester-le-Street
Johnson, Francis Dixon…Apleyheads, Durham
†Johnson, George…Blaco Hill, Retford, Notts
†Johnson, Rev. H. L.…Binderton Ho., Chichester
Johnson, Rev. P.…Wimbarthy, Chumleigh, Devon

Johnson, T. C....Chevet, Wakefield
Johnson, Thomas...Halton Grange, Runcorn
Johnson, Thomas...The Hermitage, Frodsham
†Johnson, Thomas...Whittlesea, Cambridgeshire
Johnson, Walter...Trench Hall, Gateshead
Johnson, Walter F....Leicester
Johnston, J. Lindsay...Crondall, Farnham, Surrey
†Johnstone, Rev. George...Broughton, Hunts
†Johnstone, J. C. H....Hardwick Hall, Durham
Jollands, William D....Buxshalls, Lindfield, Sussex
Jolliffe, Sir W. G. H., Bt., M.P...Heath Ho., Petersfield
Jonas, John Carter...8, St. Mary Street, Cambridge
Jonas, Samuel...Chrishall Grange, Saffron Walden
†Jones, David, M.P....Pantglas, Carmarthen
Jones, Edward...6, York Crescent, Clifton, Bristol
Jones, Fred. R., jun....County Court, Huddersfield
Jones, George...Stareton, Kenilworth
Jones, George...Whiston Lodge, Penkridge
Jones, Harvey Bowen...49, Montague Square, W.
Jones, H. P....Portway House, Warminster
†Jones, James Cove...Loxley, Warwick
†Jones, John...Blaeno's, Llandovery, S.W.
Jones, John...West Keal Hall, Spilsby
Jones, John...Bryn Adda, Dolgelly
†Jones, J. E....Springfield, Braunton, Hereford
Jones, J. O.....Dollycorsllwyn, Cemmes, Shrewsbury
Jones, Richard...Town Ho., Barthomley, Crewe
Jones, R. P....The Hermitage, Whitchurch, Salop
†Jones, Sir W., Bt....Cranmer Hall, Fakenham
†Jones, Wm....Harrington, Shiffnall
Jones, W. Hope...Hooton Farm, Sutton, Cheshire
†Jones, W. B....Kilgariff, Clonakilty, Ireland
Jordan, Francis...Eastburn, Driffield
Jordan, Wm....Charlton Kings, Cheltenham
Jowett, Rev J. F....Kingston, Bagpuze, Abingdon
Jowitt, Christopher...Palterton, Chesterfield
†Justice, Henry...Hinstock, Market Drayton

K.

†Karslake, Rev. W. H.....Mesham, Southmolton
†Kay, J. R....Bass Lane House, Bury, Lancashire
Kay, R....Forcett Valey, Aldborough, Darlington
Kearsey, Charles...Glewstone, Ross
Keary, H. W....Longlands, Holkham, Norfolk
Keeling, Charles...Congreve, Penkridge
Keeling, Chas. R....Yew Tree Farm, Penkridge
Keen, Thomas...Croydon
Keene, Rev. C. E. R....Swincombe Ho., Nettlebed
Keep, Richard...Aldermaston, Reading
Kekewich, S. Trelawli, M.P....Peamore, Exeter
Kelham, Robert Kelham...Bleasby, Southwell
Kell, William...Gateshead
†Kelsall, H., jun....Dryburgh Abbey, Roxburghsh.
†Kemble, Horatio...Potter's Bar, Barnet, Herts
†Kemble, Thomas...Legatts, Hatfield, Herts
Kemp, Jesse...Thurlby Grange, Alford
Kendrich, Edward...Wreford, Lichfield
†Kennaway, Sir John, Bt....Escot, Honiton
Kennedy, Rt. Hon. T. F....Dalquharum Castle, N.B.
Kennedy, Primrose W....Drumellan, Ayr
Kenrich, George...Thurgarton Hill, Southwell
†Kensington, Edward Thomas...Dartmouth
†Kerrich, John...Geldeston Hall, Beccles

Kerry, the Knt. of (P. Fitzgerald)...Kerry
Kersey, Clement....Whitton, Ipswich
Kersey, James...Farlton Farm, Cirencester
†Kesterton, Thomas...Sutton, Surrey
Kett, George Samuel...Brook House, Norwich
†Kettle, Geo. Mackenzie...Dallicott Ho., Bridgenorth
Key, Sir Kingsmill Grove, Bt....95, Newgate St., City
Keyes, Hen. James...Ashingdon, Rochford, Essex
†Keyworth, Henry Joseph...78, Lombard Street
†Keyworth, J. R. Haldenby..Greestone Ho., Lincol.
Kibble, Thomas...Green Trees, Tunbridge
Kiddle, F. G....Moreton, Dorchester
Killick, Arthur...Deepdene Park Farm, Dorking
Kindersley, E. Leigh...Syward Lodge, Dorchester
†King, C....North Lodge Farm, Potter's Bar, Barnet
King, George...Saffron Walden
King, Rev. James...Longfield Court, Dartford
King, J. K., M.P...Staunton Park, Leominster
King, J. L....Thorp Abbots, Scole Inn, Norfolk
King, John G....Beedon, Newbury
King, Rev. J. Meyers...Cutcombe Vicarage, Dunster
King, Hon. J. P. L., M.P....Woburn Pk., Chertsey
King, Richard King Meade...Walford, Taunton
King, R. Meade...Pyrland Hall, Taunton
King, Stephen...Old Hayward, Hungerford
King, William...Barton, Bury St. Edmund's
King, W. C....Warfield Hall, Bracknell
Kingdon, Rev. S. N....Bridgerule Vicar., Holsworthy
Kingdon, Samuel...Layrick, Thorverton
Kingsby, Thomas...Boarscroft, Tring
†Kingscote, Capt. F., R.N., M.P...Kingscote, Glouc.
†Kingscote, Thomas...Kingscote, Tetbury
Kingsford, John...Esher, Surrey
†Kingsmill, Wm....Sydmonton Park, Newbury
Kinnaird, Lord...Rossie Priory, Inchture, Perthshire
†Kirk, R....Gale Bank, Leybourne, Wensleydale
Kirkaldy, Rt. Hon. Viscount...Windsor
Kirkby, Thomas...Cuxwold, Caistor
Kirkham, John...Handleby, Spilsby
Kirkland, Sir John, Bt....17, Whitehall Place, S.W.
Kirkpatrick, Capt....Monk's Horton, Hythe
Kitson, James...Leeds
Kitson, William...Torquay
Knatchbull, Rev. W...Cholderton Lodge, Amesbury
†Knatchbull, Wm....Babington, Frome, Somersets.
Knight, A. J. R. B....Downton Castle, Leintwardine
Knight, Edward...Chawton House, Alton
†Knight, E....High Leadon, Newent, Gloucestersh.
Knight, John...Wideness, Warrington
Knight, John...Forthampton, Tewkesbury
Knight, Thomas...Norlington, Lewes
Knightley, Sir C., Bt., M.P...Fawsley Pk., Daventry
Knighton, Sir W., Bt...Blendworth Ldg., Horndean
Knollys, J. E....Fitshead Court, Taunton
Knollys, Gen....Blount's Court, Henley, Oxon
Knowles, James...Wetherby
Knox, Octavius Newry...South Collingham, Newark
Kynnersley, J. C. S....Handsworth, Birmingham
Kyrke, Rich. V....Stansby Lodge, Wrexham

L.

Lacey, Wm. Charles...Bestwell House, Wareham
Lake, James...Newlands, Teynham, Sittingbourne

Lake, Robert... Milton, Canterbury
Lakeman, John... Costislost, Bodmin
Lakin, Henry... Link End, Malvern
†Lamb, William... Hay Carr, Ellel, Lancaster
Lambe, John... Church Bank, Bowdon, Manchester
†Lambert, Chas.... Sunk Island, Ottringham, Hull
Lambert, Rob. de... Common Head, Staveley, Kendal
Lambert, Wm. Chas.... Misterton, Crewkerne
†Lamothe, Frederick J. D.... Ramsey, Isle of Man
Lander, Thomas Eaton... The Lizard, Shiffnall
†Landor, H. Eyres... Warwick
Lane, John... Barton Mills, Cirencester
Lane, John... Broom Court, Alcester
†Lane, William... Broadfield, Northleach
Langdale, Hon. C... Houghton Hall, Market Weighton
Langdale, Marmaduke R... Garston House, Godstone
Langdon, William.. Ashford House, Barnstaple
Langham, Herbert... Cottesbrooke, Northampton
Langlands, John Charles... Bewick, Alnwick
†Langton, W. H. P. Gore... Newton Park, Bath
†Lascelles, Hon. G. E... Moor Hill, Harewood, Leeds
La Touche, Col. David... Marlay, Dublin
Latham, Geo. William... Bradwall Hall, Sandbach
Lauwarne, Nicholas ..St. John's Street, Hereford
Lauder, Joseph... Burton, Christchurch
Laverack, Samuel S ... Reedness Hall, Goole
†Law, Rev. R. V.... Christian Malford, Chippenham
Lawes, J. Bennet.. Rothamsted Park, St. Albans
Lawford, Edward... Linslade, Leighton Buzzard
†Lawford, Thomas, jun.... London, Canada West
†Lawley, Hon. & Rev. S. W... Escrick Rectory, York
Lawrence, Charles... Cirencester
Lawrence, J.... Great House, Churchdown, Gloucest.
Lawrence, Thomas... Churchdown, Gloucester
†Lawrie, Andrew... Mount Mascal, North Cray
†Lawson, C... George the Fourth Bridge, Edinburgh
Lawson, Chas., jun... 34, George Square, Edinburgh
Lawson, E... Redesdale Cottage, Newcastle-on-Tyne
Lawson, Sir Wm., Bart.... Brough Hall, Catterick
Lay, Rev. John Ward... Hele, Ashburton
Lay, John W... 8, Savage Gardens, Tower Hill, E.C
Laycock, Joseph... Lints Hall, Newcastle-on-Tyne
Layton, R. Marton.. Thorney Abbey, Peterborough
Lea, Joseph... Grove Mount, Davenham
Lea, Joseph... Kinderton Hall, Middlewick
Lea, Thomas... Brown Edge, Brereton, Congleton
Leach, Henry... Corston, Pembroke
Leach, John... Ivy Tower, Tenby
Leader, Nicholas... Dromagh, Banteen, Ireland
Leather, George... Knostrop, Leeds
†Leaver, Francis... Longnor Hall, Penkridge
Ledger, Reuben.. Grove House, W. Derby, Liverpool
Lee, Charles... Grantley Hall, Ripon
Lee, Edward... Stocksfield Hall, Newcastle-on-Tyne
Lee, Joseph... Dilston, Hexham
Lee, Joseph... Redbrook, Whitchurch, Shropshire
Lee, Daniel Jas.... 4, Bedford Row, Gray's Inn, W.C.
†Lee, J. Lee... Dillington House, Ilminster
Lee, Thomas... Great Barr, Birmingham
Leech, John... Wall Hill, Leek
Leedham, William... Andover
Leeds, Henry... Stibbington, Wansford, Northampt.
†Leeds, Robt.... West Lexham, Litcham, Norfolk

Leeke, R... Longford Hall, Newport, Shropshire
Lees, John... Reigate
Leese, Benjamin... Eastling, Faversham
Legard, George... Easthorpe Hall, Malton
Legard, Capt. J. A.... Kirby Misperton, Yorkshire
Legerton, John Stock.. Shalford, Braintree
Legg, Thomas... Burton Bradstock, Bridport
Leggatt, H. B.... Brownwich, Titchfield
Leggatt, S. B.... Crofton, Titchfield
Legge, Benj.... Court Ho., Litton Cheney, Dorchester
Leigh, G. Cornwall, M.P.... High Leigh, Warrington
Leigh, C. H.... Pontypool Park, Montgomeryshire
Leigh, John Shaw ..The Hoo, Luton
Leigh, W., jun.... Woodchester Park, Gloucestershire
Leighton, Sir Baldwin, Bart.... Loton, Shrewsbury
Leir, Rev. W. M.... Ditcheat Rectory, Castle Cary
†Leith, Sir A... Glenkindie, Inverkindie, Aberdeen
†Lempriere, Capt. G. O.... Pelham Place, Alton
†Lennard, Sir T. B.... Belhus Ho., Avely, Romford
Leonard, C... Castle Camps, Linton, Cambridgeshire
Leonard, Rev. F. B.... Brook Ho., Newport, Monm.
Leslie, Charles Powell... Glasslough, Ireland
Lethbridge, Ambrose Goddard... Bank, Taunton
Lewes, Col. John... Llanllyr Talsarn, Carmarthen
Lewes, Rev. Thomas... Taynton, Burford, Oxon
Lewis, David... Stradey, Llanelly, Carmarthen
Lewis, G.... Audley, Newcastle-under-Lyne
Lewis, Edward... Pickhill Hall Farm, Wrexham
Lewis, I. H.... Gallants Ct., East Farleigh, Maidstone
Lewis, J. L. G. B.... Henllan, Narberth, Pembroke
Lewis, S.... Audley, Newcastle-under-Lyne
Lewis, Thomas... Norchard, Pembroke
Lewis, W. H.... Clynfiew, Newcastle Emlyn, Carm.
Lewis, Wyndham W.... Llanishen House, Cardiff
Ley, John Henry... Trehill, Exeter
Leyshon, Robert... Island Farm, Bridgend
Lichfield, Coventry H.... Goldes Farm, Tetsworth
Lichfield, Earl of... Shugborough, Staffordshire
Lidbetter, Richard... Bramber, Steyning
Lilley, James... Bassingbourn, Royston
Lilly, Wm. Mence... Besley Hall, Redditch
Linaker, P.... Norton Hill, Preston Brook, Cheshire
Lindley, Urban... Radmanthwaite House, Mansfield
Lindsay, Hugh H.... West Dean House, Chichester
Lindsell, Lieut.-Col... Fairfield House, Biggleswade
†Linton, Rev. J.... Hemingford Ho., St. Ives, Hunts
Lintott, Wm.... Holmbush Slinfold, Horsham
Linzee, Robert G.... Jermyns, Romsey
Litchfield, John... Epperstone, Nottingham
Little, Wm. H.... Llanvair Grange, Abergavenny
Littledale, Harold... Liscard, Liverpool
Littledale, Henry... Cardington, Bedford
Llewellin, R... Tregwynt, Fishguard, Pembrokesh.
Llewellyn, W.... Courtcolman, Bridgend, S.W.
Llewellyn, J. D... Penllergare, Swansea
Lloyd, Edw. Harvey... Aston Hall, Oswestry
Lloyd, J. A.... Leaton Knolls, Shrewsbury
Lloyd, John ..Belsize, Hampstead
Lloyd, Llewellyn F.... Nannerch Hall, Mold
Lloyd, Rev. Thos.... Rectory, Christleton, Chester
Lloyd, William Butler... Monkmoor, Shrewsbury
Leader, J.... Firgrove Farm... Whitchurch, Hants
Lobb, Geo., jun.... Lawhitton, Launceston, Cornwall

Lock, George...Instow Rectory, Barnstaple
†Lockley, Wm. J....Tillington Hall, Stafford
Lockwood, Joshua...Hawley House, Scarborough
†Locock, Sir C., Bt....Tunbridge Wells
†Locock, Edmund...South Elkington, Louth
†Locock, Fred....26, Hertford Street, May Fair, W.
Loder, Robert...The High Beeches, Crawley
Logan, R...Maindee House, Newport, Monmouthsh.
Long, Alexander [illegible]...Mint Cottage, Kendal
Long, Daniel...Whaddon, Gloucester
Long, H. Laws...Hampton Lodge, Farnham, Surrey
†Long, Kellett...Dunston Hall, Norwich
†Long, Rich. P....Dolforgan, Newtown, Montgom.
Long, Walter...Preshaw Ho., Bishop's Waltham
Long, W. Jervis...Preshaw Ho., Bishop's Waltham
†Longbourne, W. T....4, South Square, Gray's Inn
†Longcroft, C. J....Havant
Longcroft, C. R....Llanina, Aberayron, Cardigansh.
†Longe, John...Spixworth Park, Norwich
†Loomes, Edward...Whittlesea, Cambridgeshire
Lopes, Sir Massey, Bart....Maristow, Plymouth
Loraine, Edward...Capheaton, Newcastle-on-Tyne
†Lord, John...Elmley Park, Pershore
Lord, John...Hill End Farm, Chaceley, Tewkesbury
†Louch F. Wm. B....Stanchester Ho., Langport
†Lovaine, Lord...Albury Park, Guildford
Love, Peter...Northampton
Love, Samuel...Castle Farm, Shoreham, Sevenoaks
Loveday, John...Williamscote, Banbury
Lovell, Edwin...Dinder, Wells, Somerset
†Lovell, Thomas, jun....West Haddon, Daventry
Lovett, Joseph Venables...Belmont, Chirk
Lowe, Edward...Comberford Mill, Tamworth
Lowe, John...Ryhall, Stamford
Lowe, John...Whitmore House, Birmingham
Lowe, John...Wheelock Heath, Sandbach
Lowe, Peter...Marston, Stafford
†Lowndes, Geo. Alan...Barrington Hall, Harlow
†Lowndes, W. L....Linley Hall, Bridgnorth, Salop
Lowrey, Wm....Barmoor, Berwick-on-Tweed
†Loyd, Edw., jun....Prestwich Lodge, Manchester
†Lubbock, Sir J. Wm., Bt....Mansion House Street
Lucan, Earl of...Laleham, Staines
Lucas, George...Filby House, Great Yarmouth
†Lucas, Lieut. Richard...Edith Weston, Stamford
Lucas, Rev. W. N....Burgh, Acle
Luckham, Levi...Broadway, Weymouth
Lucy, Rev. J....Hampton Lucy, Stratford-on-Avon
Ludolfe, Henry...Headingley Lane, Leeds
Ludlow, H. G. G....Heywood House, Westbury
†Lugar, Henry...Hengrave, Bury St. Edmund's
Lund, Capt. Thos....Lovely Hall, Blackburn
Lungley, Brooke M....Peyton Hall, Boxford, Suffolk
†Lupton, Arthur...Newton Hall, Leeds
†Lushington, C. Manners...
Lutener, Thomas...Keele, Newcastle, Staffordshire
Luttrell, Rev. Alex. H. F....Minehead, Bridgewater
†Lyall, William...Balmakewan, Montrose, N.B.
Lyne, Charles, R.N....Newport, Monmouthshire
Lyne, Wm....Oddington, Stow-on-the-Wold
†Lynes, G. Boulton...Hackleton Ho., Northampton
†Lyon, J. W....Miserden Park, Cirencester
Lyon, Capt. T. D....Soundess Ho., Henley-on-Thames
Lysley, Wm. John...Mimwood, Potter's Bar, Herts
Lyveden, Lord...Farming Woods, Thrapstone

M.

Mabbett, John...Stinchcombe, Dursley, Gloucester
†Macclesfield, Earl of...Shirburn Castle, Tetsworth
MacClintock, Maj. H. S....Randalstown, Antrim
MacConnell, F....Robgill Tower, Ecclefechan, N.B.
†MacDonald, Sir A. K....Woolmer Lodge, Liphook
MacDouall, Col. James...Stranraer, N.B.
†MacDougall, A. H....44, Parliament Street, S.W.
†MacDowall, J. C. S....Sydney, New South Wales
Mace, J. Ellis...Ashford Road, Tenterden, Kent
†MacEwen, James...Clonshire, Croagh, Limerick
Machin, J. Vessey...Gateford Hall, Worksop
Mack, A....Livers Aele, Withington, Hereford
Mackay, Thos. Henry...Petham House, Canterbury
Mackie, W. Hay...Ysguborian, Oswestry
†MacLagan, Peter...Pumpherstone, Midcalder
Maclean, Allan, M.D....Colchester
†Macleod, Norman...
†MacNiven, Charles...Perrysfield, Oxted, Surrey
†MacIntosh, David...Havering, Romford
MacRae, Dr. A....Brinach, Beauly, Inverness-sh.
†Maddison, George Wilson...Partney, Spilsby
Maddox, John...Harley, Much Wenlock
Maden, Martin...Brant, Newark-on-Trent
†Madgwick, Wm., jun....Alciston, Lewes
†Mahon, H. J. P....Strokestown House, Roscommon
Maidens, Thomas Cousins...Brinkhill, Spilsby
†Mainwaring, C. Kynaston...Oteley Park, Ellesmere
†Mainwaring, Townshend...Galltfaenan, Denbigh
†Maitland, Lt.-Col. Fred. Thos....Paignton, Torquay
†Maitland, J. G....Surrey Villa, Lambeth, Surrey
Majendie, Ashhurst...Castle Hedingham, Essex
Makgill, George...Winchcombe, Cheltenham
†Malcolm, Lt.-Col. G. A....67, Sloane Street, S.W.
†Malcolm, John...7, Great Stanhope Street, W.
Malcolm, M....Manor House, Kineton, Warwicksh.
Male, Henry...East Chinnock, Yeovil
Malloch, C. H....Court House, Cockington, Torquay
Malmesbury, Earl of...Heron Court, Christchurch
†Maltby, Edward Harvey...G 3, Albany, W.
†Manchester, Duke of...Kimbolton Castle, Hunts.
†Mangles, F....Down Farm, Compton, Guildford
Mangles, George...Givendale Grange, Ripon
Mann, Henry...The Asps, Warwick
Mann, John...Thornage, Thetford
Mannings, George...Downton, Salisbury
Manning, Henry...251, High Holborn, W.C.
Manning, John...Orlingbury, Wellingborough
Mansel, J. C....Longthorns, Blandford, Dorset
Mansel, Lieut.-Col....Smedmore, Corfe Castle, [illegible]
Mansel, Raleigh A....Heathfield, Swansea
†Mansell, Sir John, Bart....Llanstephan, Carmarthen
Mansell, Thomas...Adcott Hall, Baschurch, Salop
Mapplebeck, W. B....6, Bull Ring, Birmingham
†Margary, Maj. A. R....Chatham Pl., [illegible]
Margetson, James...Manor House, [illegible]
†Margetts, Charles...Huntingdon
Margetts, John...High Street, Warwick

Marjoribanks, E...Greenlands, Henley-on-Thames
Marjoribanks, D. C....Bushey Hall Farm, Watford
†Marjoribanks, Edward, jun....59, Strand, W.C.
Marjoribanks, Stewart, M.P...Bushy Grove, Watford
Markby, John Randall...9, Whitehall Place, S.W.
†Markham, Charles, jun....Northampton
Markham, Lt.-Col. W. T....Milford Junction
Marmont, James. .Bristol
Marriott, Rev. J. P....Cottesbach, Lutterworth
†Marriott, W. M....Market Harborough
Marris, Thomas...Ulceby, Lincolnshire
Marsh, Matthew H., M.P....Chilbury Ho., Salisbury
Marsh, Thomas...The Heamies, Stone, Staffordshire
Marsh, Wm. Jas....Loridge, Berkeley, Gloucestersh.
†Marshall, Arthur...Headingley, Leeds
†Marshall, George Hibbert...85, Eaton Square, S.W.
†Marshall, James Garth...Headingley, Leeds
Marshall, John.. Eden Lodge, Beckenham, S.E.
Marshall, John...Riseholme Lodge, Lincoln
Marshall, H. J....Poulton Priory, Cricklade
Marshall, Wm... Bolney Place, Cuckfield, Sussex
Marsham, R., D.C.L....Merton College, Oxford
Marson, W....Acton Trussell, Penkridge
Martin, Chas. W., M.P....Leeds Castle, Maidstone
Martin, David...Wainfleet, Lincolnshire
Martin, E. Hall, jun. ..Barr Hill, Madeley, Staffs.
†Martin, E. Waterer...Nonsuch Park Farm, Ewell
†Martin, Fran. P. B....Oxford and Cambridge Club
†Martin, Gilson...Thorney, Peterborough
Martin, Henry B....Colston Basset, Bingham, Notts.
Martin, John...Barmer, Fakenham
Martin, John...Evershott, Dorset
Martin, Peter...Chilham, Canterbury
Martin, Robert...Asterby, Horncastle
Martin, S. D....3, Albion Place, Leeds
Martineau, R. ..Walsham-le-Willows, Bury St. Ed.'s
Masfen, R. Hanbury...Pendeford, Wolverhampton
†Mason, C. A. ..Tarrington, Ledbury, Herefordsh.
Mason, Capt. Geo.. .Manor House, Yateley, Hants
Mason, Matthew...9, Portland Place, Brighton
Mason, Richard...Kiddington, Louth
Mason, T....Pallinsburn Cottage, Coldstream, N.B.
Mason, Col. Wm....Necton Hall, Swaffham
Massey, Sampson. .Harkstone, Derby
Massey, Samuel...Lawton Arms, Lawton, Cheshire
Massey, Capt. H. H. G....Hazlehurst, Lymington
Master, C. L. H....Grove Lodge, Bracknell, Berks
Master, Col. Wm. C....Knole Park, Bristol
Master, Col. Thos. W. C....The Abbey, Cirencester
Masterman, Thos. J....Little Danby, Northallerton
Masterson, J....Collingbourn Ducis, Marlborough
Matchett, William...Norwich
†Matheson, Sir J., Bt., M.P...The Lewes Island, N.B.
Mathew, Nath....Wern, Tremadoc, Carnarvonshire
†Mathews, Jeremiah...Edgbaston Ho., Birmingham
Mathews, William...The Leasowes, Birmingham
Maton, Leonard Pitt ..Maddington, Devizes
Matson, William...St. Osyth, Colchester
Matthews, Francis Cook, jun....Driffield
Matthews, Frank...Glyn Moore, Isle of Man
Matthews, Francis Cook...Driffield
Matthews, Henry...Montford, Shrewsbury
Matthews, Thomas...Sporle, Swaffham
Maud, Chas. T....Manor House, Bathampton, Bath
Maude, Wm. E....3, Harrington Street, Liverpool
Maunsell, Thomas P....Thorpe Malsor, Kettering
Maw, H. Lister...Tetley, Crowle, Isle of Axholme
Maw, Math....Cleatham, Kirton-in-Lindsey, Linc.
Maxwell, Sir J. H., Bt....Springkell, Ecclefechan
Maxwell, Hon. M. Constable...Terregles, Dumfries
Maxwell, Wellwood...Munches, Dalbeattie, N.B.
May, Charles N....Devizes (North Wilts Foundry)
May, George Anderson...Elford Park, Lichfield
May, John...London Road, Reading
Mayall, John E...224, Regent Street, W.
Maybery, Walter...Brecon
Maycock. D....Gumley Hall, Market Harborough
Mayer, J. Smith...Newcastle, Staffordshire
Maynard, A. Lax....Marton-le-Moor, Boroughbridge
Mead, James.. Penrhyn, Cornwall
Mead, Wm. Rich....Ballymartle, Kinsale, Cork
Mechi, Alderman J. Jos....4, Leadenhall Street, E.C.
†Medlycott, Sir W. C., Bt...Milborne Port, Sherborne
Meeson, Wm. Taylor....Great Doggetts, Rochford
Mein, William...Brawood, Staffordshire
Meire, Sam....Castle Hill, Harley, Much Wenlock
Meire, Thos. Lockley...Cound[illegible]rbor, Shrewsbury
Mellard, James...Rugeley, Staffordshire
Mello, William...Chadwell, Ware
Mellor, John...Smallwood Ho., Lawton, Cheshire
Mellows, William...Carburton, Worksop
Melville, Hon. A. Leslie...Branston Hall, Lincoln
Melvin, James...Bonnongton, Ratho, Edinburgh
†Mercer, James, M.D....
†Mercer, William...Newtown, Warrington
Mercer, William...Grove Ho., Hunton, Maidstone
†Merriman, Thomas Baverstock...Marlborough
†Merriman, Wm. Clark...Lockeridge, Marlborough
Merson, Jas....Brinsworthy, North Molton, Devon
†Mertens, Baron Edward...Rue Ducale, Brussels
†Metcalfe, C.J., jun...5, Stock Orchard Vs., Holloway
†Methley, W....Hoath Court, Blean, Canterbury
Meux, Sir H., Bt...Theobald's Pk., Waltham Cross
†Meyer, Herman...Little Laver Hall, Ongar
†Meyer, James...Forty Hall, Enfield, Middlesex
†Meyer, P. Herman...Stondor Place, Brentwood
Meyrick, Owen Fuller...Bodergan, Anglesey, N.W.
Michell, John...Forcet Park, Darlington
Michelmore, Thomas, jun ...Berry, Totnes
Mickleburgh, Charles...Montgomery
†Micklethwaite, Rev. J....Iridge Pl., Hurst Green
Middleborough, J. R....South Milford, Milford Junc.
†Middleton, Henry...Cutteslowe, Oxford
†Midgley, W. H....Bryntirion, Corwen, Merioneth.
Midworth, John...Newark-on-Trent
Mildmay, Humphrey, M.P....Shoreham, Sevenoaks
†Miles, Sir John Wm., Bt....King's Weston, Bristol
†Miles, Grosvenor...Bourton House, Rugby, War.
†Miles, P. W. S., M.P....Leigh Ct., Bristol
Miles, Roger Dutton...Keyham, Leicester
Miles, Thomas...Keyham, Leicester
†Miles, William...Dix's Field, Exeter
Miles, Wm. Marsh...Fragham, Wingham, Kent
Milford, Thos....Thorverton, Exeter
†Miller, Bartlett...Moulton, Northampton
Miller, George...Bishop's Stortford

Miller, John, jun....Morfa Mawr, Aberystwith
Miller, Richard...155, Fenchurch Street, E.C.
Milles, G. Seymour...Bradpole, Bridport
Miller, Samuel...Dysert Farm, Welshpool
Mills, John F....Westwell, Burford, Oxon
Mills, John...Bisterne, Ringwood
Mills, John...Pinkneys Green, Maidenhead
†Mills, J. R....Englefield Green, Surrey
Mills, R. W. F....Dunnington, York
†Mills, Wm....Saxham Hall, Bury St. Edmund's
Milne, David...Milne Garden, Coldstream, N.B.
†Milne, Alexander...89, St. James's Place, S W.
Milne, Oswald, jun ...Woodville, Leamington
Milner, Sir W. M. E., Bart ..Nunappleton, Tadcaster
Milnes, James...Alton Manor, Wirksworth, Derbys.
Milward, Dawson A....Tullogher, New Ross
Minch, J. F ...
Minet, Charles Wm....41, West Smithfield, E.C.
Minett, Junius E ...Arley, Coventry
Minor, John...Fern Hill, Market Drayton
Minton, Alfred...Windsor
Mitchell, John...Wymondham, Norfolk
Mitchell, J. Hoffe.. Witchampton, Wimborne
†Mitford, Wm. Townley, M.P....Pitshill, Petworth
Molyneux, James More...Losely Park, Guildford
Monck, J Bligh...Coley Park, Reading
†Monckton, E. H. C...Fineshade Abbey, Northamp
Monkhouse, John...The Stowe, Hereford
Monins, John...Ringwould, Dover
Monro, Mordaunt Martin...Enfield
Monson, Rev. John...Rectory, Bedale
†Monteagle, Lord... Mount Trenchard, Limerick
Montgomerie, F. M...St. Leonard's Ho., St. Leonard's
Montgomery, Rev. Robert...Holcot, Northampton
Moody, Chas. Aaron, M.P....Kingsdon, Yeovil
Moody, Henry...Chartham, Canterbury
Moody, Col. R C....Junior United Serv. Club, S.W.
†Moore, Rev. Edward...Frittenden, Staplehurst
Moore, Edward Wells...Coleshill, Faringdon
Moore, George...Appleby Hall, Ashby-de-la-Zouch
†Moore, Rev. G. Bridges...Tunstall, Sittingbourne
†Moore, H...Syngfield House, Parsonstown, Ireland
Moore, J. ..11, Upper Berkeley St., Portman Sq., W.
Moore, John...Kerry, Montgomery
Moore, John...Church Street, Warwick
Moore, John...Moor House, Badsworth, Pontefract
Moore, John Kirby...Badley, Stowmarket
Moore, Joseph...Wollaton House, Nottingham
†Moore, Thos. William...Warham, Wells, Norfolk
Moore, Wm....Elm, Wisbeach
Moorsom, C. R....Coatham, Redcar
Morant, George...Farnborough, Hants
Morewood, Col. W. P....Alfreton Park, Derbyshire
Morgan, Francis...51, Bedford Square, W.C.
†Morgan, Maj. G. C., M.P....Rupera Castle, Cardiff
Morgan, John...Green Lanes, Birmingham
Morgan, John...Market Square, Shrewsbury
Morgan, Thomas...Burnt House, Waltham Cross
Morison, John Alex., M.D ...Portclew, Pembroke
Morland, George Bowes...Abingdon, Berkshire
Morland, W. Courtenay..Court Lodge, Lamberhurst
Morley, Earl of...Saltram, Plymouth
†Morley, John...
Morley, John...Broughton Lodge, Manchester
Morley, John...Cotgrave, Nottingham
Morley, John...Effingham Hill, Dorking
†Morrell, Frederick J....St. Giles's, Oxford
Morrell, James...Headington Hill, Oxford
Morrell, James Conyers...Leyland, Lancashire
†Morrice, J. W....The Tower, Calthorpe, Rugby
†Morris, Col. Lewis G....Morrisania, New York
Morris, Richard...Knockin Heath Farm, Oswestry
†Morris, Thos., jun....Walcote Fields, Lutterworth
Morris, Thomas...Maisemore, Gloucester
Morris, William...Carmarthen
Morriss, N....Blue Ho , Washington Stat., Durham
Morrow, Hugh...Corabeold House, Longford
Morton, H. J....Garforth, Leeds
Morton, John Chalmers...Streatley, Reading
†Morton, J. D....8, Gloucester Terrace, S.W.
Moscrop, W. J....Buscot Park, Faringdon
Mosley, Sir O., Bt...Rolleston Hall, Burton-on-Trent
Mosley, A. N. E....Burnaston House, Etwall, Derby
Mosley, Tonman...East Lodge, Burton-on-Trent
Moss, D. Topham...Seacroft Lodge, Leeds
Moss, Henry...Bentley Hill, Brentwood
Mostyn, Sir P., Bt....Talacre, Holywell, Flintshire
Mott, Thomas.. Much Hadham, Ware
Mott, William...Wall, Lichfield, Staffordshire
Moult, Wm....Knowsley, Prescot, Lancashire
Mount Edgecumbe, Earl of...Mt Edgecumbe, Devon
Mount, Thomas...Saltwood, Hythe
Mount, William...Wasing Place, Newbury
Moxon, William.. 8, St. Martin's Place
†Moysey, H. G....Bathealton Court, Wiveliscombe
†Muggeridge, Sir Henry, Kt....Ashurst, Dorking
Mumford, George S....Lavenham, Sudbury
†Mumford, Maurice...Creeting, Stowmarket
Mumford, William...Credonhill, Hereford
†Mumford, William Henry...Bramford, Ipswich
Mundy, William...Markeaton, Derby
†Munn, Maj. W. A....Throwley House, Feversham
Murdoch, James Gordon...1, Pall Mall East, S.W.
†Murray, Alex....11, Bedford Square, Brighton
Murton, Curteis...
Murton, Frederick...Smeeth, Ashford
Murton, William...Tunstall, Sittingbourne
Musgrave, Simeon...Market Weighton, Yorkshire
†Musgrave, Sir Geo., Bart....Edenhall, Penrith
Musgrave, Rev. Vernon...Mattersey, Bawtry
Muskett, Chas....Bressingham House, Diss
Muspratt, S., M.D...Royal Coll. Chemistry, Liverpool
Myott, James...Copesthorne, Congleton
Mytton, Thos...Shipton Hall, Much Wenlock, Salop

N.

Nainby, Richard...Barnoldby-le-beck, Grimsby
Naish, W. B....Stoneaston, Bath
Nalder, J. H....Alvescot, Faringdon
†Napier, Edw. B....Pennard House, Shepton Mallet
Napier, Hon. William....3, Old Palace Yard, S.W.
Napper, John...Ifold, Horsham
Nash, Charles...Royston, Hertfordshire
Nash, Daniel...4, York Gate, Regent's Park, W.
Naylor, John...Liverpool
†Naylor, Rich. Christopher...Hooton Hall, Chester

Neale, Charles...Mansfield Woodhouse, Notts
Neale, Charles James...Mansfield, Notts
Neame, Charles...Selling, Faversham
Neame, Frederick...Macknade, Faversham
Neame, Percy B....Swanton Lodge, Lydden, Dover
Neate, John Reeks...Northington Farm, Overton
Neave, Sir Digby, Bart....Dagenham Park, Romford
Neave, Sheffield...Oakhill House, Hampstead, N.W.
Negus, Thomas A....Braunston, Northampton
Nelson, Wm. M....Cardigan Place, Leeds
Nesham, David...Houghton-le-Skerne, Darlington
Nesfield, R. M. N....Castle Hill, Bakewell
Nesbit, Jn. C....38, Kennington Lane, Lambeth, S.
Nethercoat, John...Moulton Grange, Northampton
Neve, George...Sissinghurst, Staplehurst
Neve, Thomas...Benenden, Staplehurst
†Nevile, Rev. Christ....Thorney, Newark, Notts
†Nevile, George...Shebton, Newark-on-Trent
†Nevill, Rt. Hon. Viscount...Hope Hall, Tadcaster
Neville, Hon. C. C....Audley End, Saffron Walden
New, Richard...Hartpury, Gloucester
†Newbery, Rich. Phelps...Challenger, Axminster
Newill, Thos...Spring Bank, Welshpool
Newcastle, Duke of...20, Portman Square, W.
Newdegate, C. N....Arbury, Coventry
Newdigate, Francis...Blackheath, Kent
Newill, Joseph...Walcot, Lydbury, Shropshire
†Newman, J....Brands Ho., High Wycombe, Bucks
Newman, Thomas...Mamhead, Exeter
Newman, Thomas...Cray's Marsh Farm, Melksham
Newport, Viscount...30, Wilton Crescent, S.W.
Newsome, W....30, Milverton Crescent, Leamington
†Newton, G. Onslow....Croxton Park, St. Neot's
†Newton, R. J....Campsfield, Woodstock
†Newton, Thomas...The Cedars, Mitcham Common
Niblett, D. J....Haresfield Court, Gloucester
Nickisson, John...Stone, Staffordshire
Nicholls, John...Durant's Arbour, Enfield
Nicholls, Lambert...Rochford, Tenbury
Nichols, Ben....West End Farm, Aldershott
Nichols, George...Spa Gardens, Leicester
Nichols, John S....Buckland, Lymington
Nicholson, Brady...Stourton Grange, Leeds
Nicholson, Charles...Staniwells, Brigg
Nicholson, J...Kirkby Thore, Bridgend, Appleby
Nicholson, John...Barford St. Martin, Salisbury
Nicholson, Capt. S....Waverley Abbey, Farnham
Nicholson, Wm. Nurzam...Newark-upon-Trent
Nicklin, Richard...Glen Villa, Douglas, Isle of Man
Nies, John...Leek Wootton, Warwick
Nicol, James Dyce...5, Hyde-Park Terrace, W.
†Nield, William...Mayfield, Manchester
Nightingale, Vaughan C....Burway, Ludlow
Nightingale, W. E....Embley, Romsey, Hants
Noakes, John Tompsett...Brockley Ho., Lewisham
Nodder, Rev. J....Ashover Rectory, Chesterfield
†Norman, George Warde...Bromley, Kent
†Norman, J. Newcomb...Harborough Magna, Rugby
†Normanby, Marquis of...Mulgrave Castle, Whitby
Norreys, Robt. H....Davy Hulme Hall, Manchester
Norris, Rev. G. P....Rosecraddoc House, Liskeard
Norris, John...Pully, Shrewsbury
†Norris, Wm....Wood Norton, Fakenham
North, Chas....South Thoresby, Alford, Lincolnsh.
North, Frederick...Rougham, Norfolk
North, Lieut.-Col....Wroxton Abbey, Banbury, Oxon
†Northcote, Sir Stafford, Bt., M P....Pynes, Exeter
Northeast, Thos. Barnes...Tedworth, Marlborough
Northey, Edward Richard...Epsom, Surrey
Northey, Wm....Lake, Lifton, Devon
Norton, William...63, South John Street, Liverpool
Norton, W. F. Norton...Elton Manor, Nottingham
†Nott, James...Penn, Amersham, Bucks
†Nuttidge, Josias...Richmond, Surrey
Nowell, W. A....Cwmllecoediog Commes, Montgom.
Noyes, Thomas H....Borde Hill, Cuckfield,
Nussey, John...Birstall, Leeds

O.

Oakes, Hervey Aston...Stowmarket
Oakes, Thos. Haden...Riddings House, Alfreton
Oakley, John...10, Waterloo Place, S.W.
Oakley, Richard...Lawrence End, Luton
O'Brien, Stafford...Blatherwycke Park, Wansford
Odams, James...109, Fenchurch Street, E.C.
Oddie, Walter...Colney House, St. Alban's
†Ogden, John Maude...Sunderland
Ogilvy, Sir J., Bt....Baldovan House, Dundee, N.B.
Oldfield, Chas. Fred....Peldon Lodge, Colchester
Oldacres, Matthew...Clipston, Market Harborough
Oldham, John...Carlton-on-Trent, Notts
Olding, Edmund...Rasfin Farm, Amesbury
Oldrin, Garrould...Rumburgh, Halesworth
Oliver, James...Hanford, Blandford
†Oliver, John...Pitsford Hall, Northampton
Oliver, Robert...Sholbrook Lodge, Towcester
Olorenshaw, Joseph...Hatton Grange, Warwick
Ord, Rev. J. A. B....Whitfield Hall, Northumberland
Orde, Charles William...Nunnykirk, Morpeth
†Orde, Sir J. P. W., Bt....Kilmorey Ho., Loch Gilphead
Orlebar, R. L....Hinwicke House, Wellingborough
Ormerod, George...Sedbury Park, Chepstow
Ormerod, Henry Mere...5, Clarence St., Manchester
Ormston, Robert...Newcastle on-Tyne
Ormond, Francis...Owston, Oakham
Orton, Francis...Bottisford, Nottingham
Osbiston, Samuel, jun....Ryburgh, Fakenham
Osborn, Charles...Fareham
†Osborn, G., jun....Manor Ho., Pattishall, Towcester
Osborne, Geo....Court Farm, Elberton, Bristol
Osborne, Henry...Weeford Park, Hints, Tamworth
Ostler, John, jun....Walrond Park, Taunton
Oswell, Thos. Basnett...Hanley Hall, Shrewsbury
Other, Chris...Elm House, Leyburn, Yorkshire
†Otrante, Count A...Nygard, Söderköping, Sweden
†Overman, Henry R....Weasenham, Fakenham
†Overman, John...Burnham, Sutton, Norfolk
†Overman, Robert...Egmere, Walsingham, Norfolk
Owen, B. H. Bulkeley...Tedsmore Hall, Salop
Owen, E. W. S....Condover, Shrewsbury
Owen, Richard...Haughton, Tarporley
Owen, William...Blessington, Ireland
Owen, William...Rotherham
Owsley, Wm. P. Mason...Blaston, Uppingham
Oxford, Bishop of...Cuddesdon, Wheatley, Oxon

P.

Pack, Thomas Henry…Ditton, Maidstone
†Packard, Edward…Ipswich
†Packe, Rev. A.…Walton Rectory, Loughborough
†Packe, Geo. H.…Caythorpe Hall, Grantham
†Packe, Dr. James…Melton Lodge, Woodbridge
Paddock, Henry…The Trench, Ellesmere
Padwick, Fred…West Thorney, Emsworth, Hants
Page, Edward…Bedford
Page, Thomas…Tower Cressy, Campden Hill, W.
Paget, C., M.P.…Ruddington Grange, Nottingham
Paget, E. Arthur…Thorpe, Leicester
Paget, Henry…Birstal, Leicester
Pain, John…Popham, Micheldever Station
Pain, Philip…Boughton House, Kettering
Pain, Thomas…Laverstock Hall, Salisbury
†Paine, Mrs.…Farnham, Surrey
Paine, Wm. Dunkley…Cockshutt Hill, Reigate
Painter, John…Burley-on-the-Hill, Oakham
Paitson, William…Irish Street, Whitehaven
†Palin, William…Stapleford Hall, Chester
Palmer, Sir Geo. J., Bart.…Wanlip Hall, Leicester
Palmer, Sir J. H., Bt.…Carlton Park, Rockingham
†Palmer, Rev. P. H.…Wolsthorp Rectory, Grantham
Palmer, Thos.…Stoke Climsland, Callington
†Palmerston, Viscount, M.P.…Broadlands, Romsey
Papendick, Bridget Ann…Glasbury Ho., Hay, S.W.
Papillon, Thomas…Crowhurst Park, Battle
Paramore, J. Rawle…Dinedor Court, Hereford
†Parker, Charles Stuart…Annesley, Liverpool
Parker, James…Great Baddow House, Chelmsford
Parker, K. S., Q.C.…Examiner's Office, Rolls Yard
Parker, J. O.…Woodham Mortimer, Maldon, Essex
Parker, Thomas James…10, George St., Sheffield
†Parker, Charles…Binfield, Bracknell, Berks
†Parker, Wm.…Carlton Hill, Penrith
Parker, William…The Park, Ware, Hertfordshire
Parker, Maj. W., M.P.…Clopton Hall, Suffolk
Parker, Rev. W.…Rectory, Little Comberton, Pershore
Parker, Rev. W. H.…Saham Rectory, Watton, Norf.
Parkin, John…Idridgehay, Wirksworth
Parkinson, John…Leyfields, Newark, Notts
†Parkinson, J., jun.…Farmers' Club, New Bridge St.
†Parkinson, Thomas…Hexgreave Park, Southwell
†Parkyns, Sir Thos. G. A., Bt.…Ruddington, Notts.
Parr, Samuel…The Poultry, Nottingham
Parrott, Thos.…Green Bank, Sutton, Macclesfield
Parry, Nicholas…Little Hadham, Ware
Parson, Rev. W. H.…Lynchmere Rectory, Haslemere
Parsons, C., jun.…N. Shoebury Hall, Rochford, Essex
†Parsons, Geo.…West Lambrook, South Petherton
†Parsons, Henry…Haselbury, Crewkerne
Parsons, John…Oxford
Parton, John…Chorlton, Nantwich
Partridge, John…Bishop's Wood, Ross
Pasmore, James…High Street, Exeter
†Paterson, Geo.…Foyle House, Colnbrook, Bucks
Paterson, Richard…[illegible], Chislehurst
†Pateshall, Evan…Hereford
[illegible], Simon…16, Bedford Place, Russell Sq., W.C.
—, Capt. W. H. T.…Ibornden, Biddenden
—, Richard…[illegible] Hall, Carlisle

Patterson, John…Hall Bank, Ulverston, Lancashire
†Patterson, W. J.…Durnford Lodge, [illegible]
Paver, William…Parkfield, Milford Junction
Pawlett, Thos. Edward…Beeston, Sandy, Beds
†Paxton, Sir Joseph, Bt., M.P.…Chatsworth, Bakewell
Paxton, Robert…Lower Winchendon, Aylesbury
Paxton, Thomas…Potsgrove, Woburn, Beds
Payne, Henry…Birdbrook, Halstead, Essex
Payne, William…Willcott, Nesscliff, Salop
Peachey, Wm.…Ebernoe, Petworth
Peacock, Wilkinson…Greatford Hall, Stamford
†Peacocke, G. M., M.P.…33, Hertford St., May Fair
†Peacocke, Warren…Efford, Lymington, Hants
Pearce, Col. Wm.…Ffrwdgrech, Brecon
†Pearman, L.…Mercote Hall, Berkswell, Coventry
†Pearse, Henry…3, Great Cumberland Street, W.
Pedder, Edward…Ashton Park, Preston, Lancashire
Peel, Edmund…Bryn-y-Pys, Wrexham
Peel, George…Brookfield, Cheadle, Manchester
Peel, John…Middleton Hall, Fazeley
†Peel, Jonathan…Knowlmere Manor, Clitheroe
Peel, Sir R., Bart., M.P.…Drayton Manor, Fazeley
Peel, Wm.…Taliaris Pk., Llandilo, Carmarthenshire
Peel, William…Trenant Park, Looe, Cornwall
Peers, Joseph…Ruthin
†Peile, Thos. Williamson…Tullihinel, Kerry
Peirson, John…25, Micklegate, York
†Pell, Albert…Haselbeach, Northampton
†Pell, Sir Watkin O.…Royal Hospital, Greenwich
Pellatt, Apsley…Knowle Green, Staines
Pellv, Sir John Henry…Warnham Court, Horsham
Pelly, Capt. R. Wilson…The Willows, Upton, Essex
†Pemberton, Rev. R. N.…Church Stretton, Salop
†Penn, Granville J.…
Pennant, P. P.…Sychton, Flintshire
Pennell, M. B.…Dawlish
Pennell, Rich. Lewin…Venbridge, Exeter
Pennethorne, J.…Hamstead Ho., Yarmouth, I. of W.
Penrice, Thomas…Kilvrough, Swansea
†Peploe, Capt. Daniel Peploe…Garnston, Hereford
Pepper, John…3, Queen Street, Leeds
Pepper, William…Clarendon Mount, Leeds
Peppercorne, H.…Bradburn Pk., East Malling
†Perceval, Chas.…West Haddon, Northamptonshire
Percival, Ralph H.…Tetton Hall, Middlewich
Peren, W. B.…Compton, South Petherton, Somerset
Perkins, A.…Westfield Ho., Market Harborough
Perkins, John S.…Leek Wootton, Warwick
Perkins, Thomas…Hitchin
†Perry-Watlington, J. W.…Moor Hall, Harlow
Perry, Samuel…Shipley, Bridgenorth
†Perry, Thos. A.…Bitham Ho., Avon Dassett, Banbury
Perry, Sir T. E., M.P.…West Court, Berkshire
Perry, William…Cholstrey, Leominster
Perry, Wm.…Up [illegible], Totnes, Devon
Pertwee, J. F.…Rettendon, Wickford, Essex
Peters, Daniel…31, College Green, Bristol
†Peto, Sir S. M., M.P.…Somerleyton Hall, Suffolk
Petman, Robt.…Ashley House, Folkestone
Phelips, Charles…Briggins Park, Ware
†Philips, Sir G. R., Bart.…Shipston-on-Stour
Philips, Mark…Snitterfield, Stratford-on-Avon
Phillips, G. L., M.P.…Lawrenny Castle, Pembroke

Phillipps, James...Bryngwyn, Ross, Herefordshire
†Phillipps, Robt. Biddulph...Longworth, Hereford
Phillipps, J. B. L....Penty Park, Haverfordwest
Phillipps, Wm....The Lodge, Reigate
Phillips, John...Lordship Lane, Tottenham
Phillips, J. B....Brackton Leasows, Newport, Salop
Phillips, Rev. John...Ludlow, Salop
†Phillips, J. H....Bradburne Grange, Nawton, York
Phillips, J. R. S....Riffham's Lodge, Chelmsford
Phillips, Joseph Taylor...Sheriff Hales Manor, Salop
Phillips, Sir Thos., Knt....Llanellan, Abergavenny
†Phillpotts, T., jun....Risca, Newport, Monmouthsh
†Phipps, C. Paul...Chalcot House, Westbury, Wilts
Phipps, Christopher...River, Dover
†Phipps, John Lewis...Leighton, Westbury, Wilts
Pickering, Leonard...Wilcot, Charlbury, Oxon
†Pickford, William...148½, Fenchurch Street, E.C.
Pickin, W. C....Dunham, Notts
Pickin, Wm. John...Whitemoor, Ollerton, Notts
†Piercy, Alfred...Cold Harbour, Henley, Oxon
†Pierson, Jas. Alex....The Gwynd, Arbroath, N.B.
Piggot, Jas. Algernon...Beckingham Hall, Witham
†Piggott, Geo. G....Gwydyr House, Whitehall
Piggott, Simon Frazer...Fitzhall, Midhurst, Sussex
Pigott, Sir Robert, Bart....Patshill, Wolverhampton
Pike, James...Reading
Pike, William...Steventon, Beds
Pilcher, Jesse...Cheriton Court, Hythe, Kent
Pilgrim, Charles H....
Pilgrim, S. C...Manor House, Burbage, Hinckley
Pilkington, Sir L. M. S., Bart....Wakefield
Pillans, Wm....
Pimlett, Josh....Norton-in-Hales, Market Drayton
Pinckard, John Thomas..Handley, Towcester
Pinder, Thomas...Barroby, Grantham
†Pinnegar, C....Rockbourn, Fordingbridge, Hants
Pinney, Col. W., M.P....Somerton, Somerset
†Pipon, Capt M....Deerswood, Crawley
Pippet, William...Caughton House, Bromsgrove
Pitcairn, Alex....Easdale, Castle Oban, Argylesh.
Pitfield, A. J...Eype, Symondsbury, Bridport
Pitman, James S....Dunchideock House, Exeter
Pitt, George...Chadnor Court, Dilwyn, Leominster
Plant, John...Model Mill, Sheffield
Plant, Thomas...Elworth Hall, Sandbach, Cheshire
Plowden, W....Plowden Hall, Bishop's Castle, Salop
Plowman, Joseph...Oxford
Plumbe, John...Ashton Keynes, Cricklade
Plumptre, J. P....Fredville, Wingham, Kent
†Pocock, Chas....
Pocock, George...Redbourn Bury, Redbourn
Pocock, Sir G. E., Bt....Cambridge Ho., Tunbr. Wells
Pointon, George...Mere Cottage, Lawton, Cheshire
Pole, Sir Peter Van Notten, Bt....6, Upper Harley St.
Pole, Rev. Reginald Chandos...Radbourne, Derby
†Pollard, Joseph....Highdown, Hitchin, Herts
Pollen, Sir J. W., Bt....Redenham, Andover
†Pollen, R. H....Radbourne, Chippenham
Pollock, J. O. G...Mountain's Town, Navan, Ireland
Pomfret, Earl of...Easton Hall, Towcester
†Pomfret, Virgil...Tenterden, Kent
Poole, Domville...Marbury, Whitchurch, Shropshire
Pooly, Thomas...North Wold, Norfolk
Pope, Edward...Great Toller, Dorchester, Dorset
Pope, John...Symondsbury, Bridport, Dorset
Pope, J. Raymond...Shipridge Farm, Mitcheldean
Pope, Thomas...Harewood, Bletchingly, Surrey
Porcher, Charles...Cliffe, Dorchester, Dorset
Portal, M....Laverstoke House, Micheldever Station
Porter, Maj.-Gen....Mintern Ho., Dorchester, Dorset
Porter, Thos....Bawnton, Cirencester
Porter, Wm....Hembury Fort, Honiton
†Portsmouth, Earl of...Eggesford Ho., North Devon
Postlethwaite, Thomas....Offley Hotes, Hitchin
Potter, John...Basinghall Street, Leeds
Potter, T. B....Bush Hill, Manchester
†Powell, Alex....Hurdcott House, Salisbury
Powell, Evan....Trewythen, Llandinam, Montgom.
Powell, George...8, Beaufort Buildings, Strand
Powell, John...Watton Mount, Brecon
Powell, John Thomas...Easton, Pewsey, Wilts
Powell, Phillips...South Lands, Denham, Uxbridge
Powell, J. Folliot...7, Albion Place, Hyde Park, W.
Powell, Richard...Benson, Oxon
†Powell, Rev. S. H...Sharon Hall, Ripon
†Powell, Thos. H...Drinkstone Pk., Woolpit, Suffolk
†Powell, T., jun....Cold[illegible], Newport, Monmouthsh.
Powell, Wm...Eglwys Nunydd, Margarn, Glamorg.
Powell, Wm....Tickford Abbey, Newport Pagnell
†Power, K. Manley...Hill Court, Ross, Herefordshire
†Powlett, Lord William...Downham Hall, Brandon
†Praed, W. Backwell...Tyringham, Newport Pagnell
Pratt, Edward...Caldwell, Burton-on-Trent
Pratt, Rich. Fred....Gt. Sanders, Sedlescomb, Battle
†Prentice, Manning...Stowmarket
Prescott, William...Clarence, Roehampton, S.W.
Preston, Thomas...Scosthrop Ho., Bell-Busk, Leeds
†Pretyman, Arthur...Llanfair, Anglesey
Price, Edw....Court House, Pembridge, Leominster
Price, J....Yew Tree House, Prestwood, Stourbridge
Price, Joshua...Featherstone, Wolverhampton
Price, William...Glantwick, Swansea Valley
Price, Wm. Philip, M.P....Tiberton Ct., Gloucester
Prickard, Thos....Dderw Ho., Rhayader, Radnorsh.
Priday, Samuel...Linton, Gloucester
Prideaux, Sir Edm. S., Bart....Netherton, Honiton
Priest, Alfred...Kingston-on-Thames
Priestley, J....Hirdrefaig, Bangor, Isle of Anglesea
Priestley, S. O....Trefan, Pwllheli, Carnarvonshire
Princep, William...Newton, Tamworth
†Pritchard, George...Broseley, Salop
†Pritchard, John...Broseley, Salop
Pritchard, Robt....Llwydiarth Esgob, Bangor
†Probyn, Edmund...Huntley, Gloucestershire
Proctor, Thomas...Cothay, Wall's Court, Bristol
†Prodgers, Herbert...Ayott Rectory, Welwyn
†Prosser, Francis Wegg, M.P....Belmont, Hereford
Pryke, John...Aldersfield Hall, Wickhambrook
Pryor, John Izard...Clay Hall, Stevenage, Herts
Pryor, Morris...Baldock, Herts
Pryse, John Pugh...Bwlchbychan, Lampeter, S.W.
Pugh, David, M.P...Llanerchydol, Welshpool, Montg.
†Pugh, William...Coal Port, Ironbridge, Salop
Puleston, Rev. T....Worthenbury Rectory, Flintsh.
†Pulleine, James...Crakehall, Bedale
†Puller, Christopher W...Youngsbury, Ware, Herts

†Punnett, P. Simpson...Chart Sutton, Staplehurst
Punchard, Charles...Blunt's Hall, Haverhill, Suffolk
Purser, Edward...116, Fenchurch Street, E.C.
Purton, Wm....The Woodhouse, Cleobury-Mortimer
Purves, Peter...The Grove, Brampton, Huntingdon
Pusey, S. E. B....Pusey House, Faringdon
Pyatt, Abraham...Wilford, Nottingham
Pye, Henry Abington...Louth, Lincolnshire

Q.

Quartly, Jas....Molland House, South Molton
Quartly, John...Champson Molland, South Molton
Quicke, Rev. Andrew...Winchester
Quinn, P., J.P....Agency, Poyntz Pass, Ireland

R.

Racster, William...Withington Court, Hereford
Radcliffe, Rev. Walter ..Warleigh, Plymouth
Radford, H. B... Stanton Ho., Burton-on-Trent
†Raincock, H. D. ..Croydon
Raine, William Surtees ..Gainford, Darlington
Ralph, R. W....Honnington Grange, Newport, Salop
Ralston, James...Danesfield, Great Marlow
Ralston, Wm. Henry...Keele, Newcastle, Staffs.
Rammell, Thomas...Sturry Court, Canterbury
Ramsay, G. H....Derwent Villa, Newcastle, North.
Ramsay, John...9, Endsleigh Street
Ramsden, Robert...Carlton Hall, Worksop
Randall, Alexander...Maidstone
Randell, Charles...Chadbury, Evesham
Randolph, Vice-Ad. C. G....Gt. Comp, Sevenoaks
Randolph, Lt.-Col. C. W....5, Victoria Sq., Pimlico
Randolph, James...Milverton, Somerset
Ranger, H. W....Court Lodge, Ashurst, Tonbridge Wells
Ranken, W. B....Abbott's Langley House, Herts
Rankin, John...Union Foundry, Liverpool
Ransome, James Allen...Ipswich
Ransome, J. E....Bolton Hill, Ipswich
Ransome, R. C....Bolton Hill, Ipswich
Ransome, Robert ..Ipswich
Ratleff, William...Newmarket
Rawes, John...Springwood Cottage, Chorley
Rawlence, James...Bulbridge, Wilton, Salisbury
Rawson, Charles...Glanhenwyr, Glasbury, Hereford
Rawson, Richard...Wheat Hill, Roby, Preston
Ray, Henry...Bristol
†Ray, Samuel. .St. Paul's, Belchamp, Halstead
Rayer, John...Eastington, Northleach
Rayer, Wm. Carew...Tidcombe, Tiverton
Rayment, W....Ferneux Pelham Hall, Buntingford
†Raynbird, Hugh...Church Street, Basingstoke
Raynbird, Robert...Hengrave, Bury St. Edmund's
Rayner, Henry...Ely
Rea, Edward...115, Wardour Street, Soho, W.
Rea, James...Monaughty, Knighton, Radnorshire
Rea, Thomas..Westonbury, Pembridge, Leominster
†Read, Clare Sewell...Plumstead, Norwich
†Read, Geo., jun.. Baxton Hall, Brandon, Norfolk
Read, James...Whittlesea
Read, James Marsh...Elkstone, Cheltenham
Read, Richard...85, Regent Circus, Piccadilly, W.
Redgate, T. Blatherwick...Scarthing Moor, Newark
Rees, W. Treharne...Holly House, Newport, Mon.
Reeve, Major-Gen....Leadenham, Grantham
Reeves, J. R....Hantsland, Crawley Down, Sussex
Reid, Sir John Rae, Bart....The Grove, Ewell
Relph, G. R. Greenhow...Beech Hill, Usk
Rendle, William Edgcumbe...Plymouth
Reynardson, Henry Birch ..Adwell, Tetsworth
Reynolds, Joseph Benj....Lubbesthorpe, Leicester
†Reynolds, Dr. William...Coed-dû, Mold
Rhodes, C....Little Oat Hall, Wivelsfield, Sussex
Rhodes, J. Armitage...Roundhay, Leeds
Rhodes, James...Seal Lodge, Farnham, Surrey
Ricards, Mortimer...Bure Homage, Christchurch
Rice, Edward Royd...Dane Court, Wingham
Rich, Stiles...Didmarton, Chippenham
†Richards, Edward Priest...Cardiff
†Richards, J....Mathrafel, Meifod, Montgomersh.
Richards, W...Nyoddfraith, Newtown, Montgom.
Richardson, G....Bridlington Quay, Yorkshire
Richardson, Henry...Cherry Hill, York
Richardson, J....Northlands House, Winterton Brigg
Richardson, John...Asgarby, Spilsby
Richardson, J. W....Willoughton, Kirton-in-Lindsey
Richardson, Sir J. S., Bt....Pitfour Castle, Perth, N.B.
†Richardson, Robt.....Cunningham, Londonderry
Richardson, T. M....Hibaldstow Grange, Kirton
Richardson, Capt. Thos....Sutton Hurst, Lewes
†Richmond, Duke of...Goodwood, Chichester
Richmond, Francis...Salford, Manchester
Rickard, Martyn William...Devonport
Riddell, E....Cheeseburn Grange, Newcastle-on-Ty.
†Riddell, Sir W. B., Bt...Hepple Rothbury, Morpeth
Rider, Joseph...Leeds
Ridge, T. J....Hambledon, Horndean, Hampshire
Ridgway, Alex., jun....Blackanton, Totnes
Ridgway, John...Fairlawn, Wrotham, Kent
†Ridgway, J....Cauldon Pl., Shelton, Stoke-on-Trent
Ridgeway, Thomas...Lymm, Warrington
Ridley, J....Park End, Hexham, Northumberland
Ridley, J. M....Walwick Hall, Hexham, Northumb.
Ridley, Rev. N. J... Hollington House, Newbury
Ridley, T. D....Chelmsford
Rigden, Richard Henry ..Salisbury
Rigden, William...Hove Farm, Brighton
Rigg, Joseph...Filloughby, Coventry
Riley, Edmund...South Dalton, Beverley
†Riley, Luke...Meriden, Coventry
Riley, W. F....Forest Hill, Windsor
Ringer, John...West Harling, East Harling, Norfolk
Rising, Robert...Horsey, Great Yarmouth
Rising, Wm....Somerton Hall, Great Yarmouth
Risley, Rev. W. C....Deddington, Banbury
Rist, Isaac...Tattingstone, Ipswich
Rivers, Lord...Rushmore Lodge, Ludwell, Salisbury
†River, John...
Rix, Benjamin...St. Matthews, Ipswich
Roads, J....Ashmore Farm, Addington Winslow
Roberts, Edw....Almshoe Bury, Hitchen
Roberts, Fred. Rowland...Aberystwith
Roberts, Joseph...Southleigh, Truro
Roberts, Richard...Stanage, Brompton, Bryan
Roberts, Thomas Lloyd...Crofton Hall, Bromfield
Roberts, Thomas...Ivington Bury, Leominster

†Roberts, Wightwick...Trethill, Sheviock
Robertson, Gen. W. D...Chewton Glen,
Robey, Robert...Canwick Road, Lincoln
Robinson, D....Clitheroe Castle, Clitheroe
Robinson, George...Whiston, Shiffnall
Robinson, Rev. Sir G. S., Bt....Cranford, Kettering
Robinson, Isaac...Iron Foundry, Halesworth
Robinson, Jas....Huggart's Farm, Brindle, Chorley
Robinson, John...Gloucester
†Robinson, Jos....Clifton Pastures, Newport Pagnel
Robinson, Thomas...Witham, Alford
Robinson, Thomas...Nuthill, Hedon, Yorkshire
Robinson, Thomas...Castle Ashby, Northampton
Robinson, William...Bone Hill, Tamworth
Robinson, William...Heatley Lymm, Cheshire
Robson, James...Brackenborough, Louth
†Robson, John...East Kielder, Bellingham
Robson, William...Wilton, Salisbury
†Roch, Nicholas...Paskiston, Pembroke
Rocke, James John...Glastonbury
†Rodd, F. H ...Frebartha Hall, Five Lanes, Cornwall
Roddam, J J....Newtown, Stanhope, Darlington
Roddam, Wm... Roddam, Wooler, Northumberland
Rodwell, William...Woodlands, Ipswich
†Roebuck, J. A., M.P....19, Ashley Place, Pimlico
†Rogers, F....3, Ravenscourt Terrace, Chiswick
Rogers, Henry...Stagenhoe Park, Welwyn
†Rogers, John J.. .Penrose, Helston
†Rolfe, C. Fawcett Neville...Sedgeford Hall, Lynn
Rolls, John E. W....The Hendre, Monmouth
Rolt, John...Ozleworth Park, Gloucester
Rome, Thomas...Groundslow, Stone, Staffordshire
Romilly, Edward. .Porthkerry, Cardiff
Romney, Earl of...The Mote, Maidstone
†Rooper, George...Nascott House, Watford
†Rooper, J. B ...Abbotts Ripton, Hunts
Root, William ..Chipping Warden, Banbury
†Roper, R S. D. R....Sedbury Pk., Richmond, Yks.
Rose, Philip.. Rayners, High Wycombe, Bucks
Ross, James...Hoo Park Farm, Luton
Rossmore, Lord...Monaghan, Ireland
†Rothwell, R. R ...Sharples Hall, Bolton, Lancashire
Rothwell, W. T....Foxholes, Lancaster
Rotton, Richard...3, Boltons, Brompton, S.W.
Round, Chas. Grey...Birch Hall, Colchester
Roughead, James...Auldhame, North Berwick
Rous, Col. G....23 A, Bruton Street
Rous, Hon. Wm. Rufus...Worstead House, Norwich
Row, Wm. North.. Cove, Tiverton
Rowe, Samuel...Duddon Lodge, Tarporley
Rowe, W. Wevill...Milton Abbot, Tavistock
Rowland, Alexander...Rosenthall, Lewisham
Rowland, Edward...Claygate House, Esher
Rowland, John...Islip, Oxford
†Rowland, R....Creslow, Aylesbury
Rowley, George W....St. Neot's
Rowley, Hon. R. T...Rhyderddwyn Faur, Rhuddlan
Rowley, John Geo....Rockstowes House, Dursley
Rowley, John Jephson...Rowthorne, Chesterfield
†Royds, Albert Hudson...Falinge, Rochdale
†Royds, Rev. John...Heysham Rectory, Lancaster
Royston, Viscount...Wimpole, Cambridgeshire
Ruck, Edmund...Castle Hill, Cricklade
Ruck, Lawrence...10, Staple Inn, W.C.
Rudyerd, Henry...Swanmore, Bishop's Waltham
Rue, Robertson...Warfield, Bracknell, Berks
Rumbold, C. J. A....5, Percival Terrace, Brighton
†Russell, Lord C. J. F....Drakeloe Lodge, Woburn
Russell, David...Clifton Lodge, York
Russell, G. Lake...62, Lowndes Square, S.W.
Russell, John...Piercefield Park, Chepstow
†Russell, Robert...Pilmuir, Leven, Fife
Russell, Robert...Farningham, Dartford
†Russell, Sir W., Bt., M P...Charlton Pk., Cheltenham
Rust, James ..Alconbury, Huntingdon
Rust, Wm. Holyoake...Good Easter, Chelmsford
Ruston, A. S...Aylesbury Ho., Chatteris, Isle of Ely
Ruston, Joseph...Lincoln
Rutson, Wm....Newby Wisk, Northallerton
†Ryder, Hon. G. D....Westbrook, Hemel Hempsted
Ryder, T. B....2, Elliot St., Clayton Sq., Liverpool
Ryland, T....Gt. Lister Street Works, Birmingham
Rylatt, W....Branswell, Sleaford

S.

Sabin, John...Harbury, Southam, Warwickshire
Sadler, Benjamin Greame.. Linen Hall, Belfast
Sadler, Henry...Mid-Lavant, Chichester
Sadler, T. W....Norton Mains, Ratho, Edinburgh
Sadler, Thomas...Chiddingfold, Surrey
Sadler, William...Chiddingfold, Surrey
Sadler, Wm....Ferry Gate, Dirleton, Haddingtonsh.
Sadler, William James...Calcutt, Cricklade
Sainsbury, W....Hunts Ho., W. Lavington, Devizes
†St. Albans, Duke of...Redbourne Hall, Brigg
†St. Maw, Lord Archibald...Burton, Loughborough
†St. Leger, A. F. Butler...Park Hill, Rotherham
Sallit, Matthew...Saxlingham, Norwich
†Salkeld, Thomas...Holme Hill, Carlisle
Salomons, David...Broom Hill, Tonbridge
Salt Herbert...Methley Park, Leeds
Salt, Thomas...Weeping Cross, Stafford
Salt, Titus ..Methley Park, Leeds
Salter, W. P., jun....The Abbey, Thetford
Saltmarshe, Philip...Saltmarshe, Howden
Salusbury, Rev. Thelwall J. T.. .Offley, Hitchin
†Salvin, M. C...Sarnsfield Court, Kington, Hereford
Samman, Wm....Middleton Park, Bicester
Samman, John...Broadwell, Moreton-in-the-Marsh
Sampson, Thomas...Moor Hall, Ninfield, Battle
Samuelson. B....Britannia Iron Works, Banbury
Samson, T....Kingston Russell, Dorchester, Dorset
Sanday, W....Holme Pierrepoint, Nottinghamshire
†Sandbach, H. R. ..Hafodunos, Llanrwst, Denbighs.
Sanders, E. A....Stoke House, Exeter
Sanders, Henry...Harleston, Northampton
Sanderson, Hastings...5, Brinswood E., Leamington
†Sandford, Marks...Martin, Dover
Sandham, Major...Rowdell, Steyning
Sandle, Wm ...Withersfield Place, Braintree
Sandwich, Earl of...Hinchingbrooke House, Hunts.
Sankey, Robert...Canterbury
Satchwell, T...Hernfield Ho, Knowle, Birmingham
†Satterfield, Joshua...Alderley Edge, Manchester
Saunders, Randle Wm....Nunwick Hall, Penrith

†Saunders, Thos. Rich...31, Thurlow Square, S.W.
Saunders, T. H....Watercombe, Dorchester, Dorset
†Saunders, William Wilson...Hillfield, Reigate
Savery, A. B....Hardwick Lodge, Chepstow
Savery, John...Exeter
Savory, James...Tewkesbury
†Savignon, Don D. (Mexico)...23, Royal Exch., E.C.
Sawers, John...Dunbar, Scotland
Sawyer, Charles...Heywood Lodge, Maidenhead
Saxby, Thomas...West Firle, Lewes
Saxelby, Thomas...Great Sparkbrook, Birmingham
Say, R. Hall...Oakley Court, Windsor
Sayers, John...Field Dalling, Holt, Thetford
Scarborough, John L....Colyford, Axminster
Scarsdale, Lord...Kedleston Hall, Derby
Scarth, Edw....Westside House, Darlington
Scarth, Jonathan...Shrewsbury
Scarth, Thos. Freshfield...Keverstone, Darlington
Scarth, William Thomas...Keverstone, Darlington
Schollick, E. Jones...Aldingham Hall Ulverston
Schramm, Rudolph...Grove Park, Camberwell, S
Schreiber, Capt. T. W....Melton, Woodbridge
†Schwann, F. S...N. Houghton Manor, Stockbridge
Scoones, H. B....Fowle Hall, Brenchley, Kent, S W.
Scott, Col. Hon. C. Grantham...79, Eaton Sq., S.W.
Scott, Jas. Winter...Rotherfield Park, Alton, Hants
Scott, John B....Bungay, Suffolk
Scott, J....Green Head, Milnthorpe, Westmoreland
Scott, Joseph...Colney Hall, Norwich
Scott, Thomas...Broomhouse, Berwick-on-Tweed
Scott, Thomas... 18, Parliament Street
Scott, Thomas Edward...Crondall, Farnham, Surrey
Scragg, Thomas...Calveley, Tarporley
†Scragg, William.. Great Clacton, Colchester
†Scratton, D. R....Prittlewell Priory, Rochford
Scratton, Rev. Thomas Scott...Terrace, Southend
Scriven, George...Castle Ashby, Northampton
Scudamore, Lt Col....Kentchurch Court, Hereford
Seal, Charles Wm....Leighdelamere, Chippenham
Seamark, Richard...Mount St. Alban's, Caerleon
Searson, R....Cranmore Lodge, Market Deeping
†Sebright, Sir T. G S., Bart....Market Street, Herts
†Sedgwick, Professor...Trinity College, Cambridge
Seels, Henry John...Wainfleet Hall, Lincolnshire
Selmes, James...Tufton Pl., Northiam, Staplehurst
Senhouse, Capt. Wm....Ashby St. Ledgers, Rugby
Seppings, T. Johnson...South Creake, Fakenham
Sergeantson, Geo. John...Camp Hill, Ripon
Severn, J. P....Penybont Hall, Penybont, Radnorsh.
Seward, Samuel...Weston, Petersfield
Sexton, George...Wherstead, Ipswich
†Sexton, G. Mumford.. Wherstead Hall, Ipswich
†Seymer, K. H....Hanford, Blandford
Seymour, H. D, M.P...Knoyle House, Hindon, Wilts
Seymour, Col....Windsor
†Seymour, Rev. Sir J. H. C....Berkhampstead
Shackel, George...Earley Court, Reading
Shackleton, John...Scarcroft, Leeds
Shafto, Rev. J. D....Buckworth Rectory, Huntingdon
Shafto, T. D....Cheveney House, Hunton, Maidstone
Shann, Charles...Inholes, Tadcaster
Sharp, Isaac...Dairyknoll, Middlesborough-on-Tees
Sharp, William J....Cop Hill, Epsom
Sharpe, James...Fawley Court, Henley-on-Thames
Sharpe, Robert...Hewelsfield Court, Chepstow
Sharpe, William...Mavis Enderby, Spilsby
Shaw, Alex. Nesbitt...Newhall, Fortrose, Rossshire
Shaw, Chas. Henry...Woodbine Cottage, Hackney
†Shaw, John...Beddington Lodge, Croydon
Shaw, John...Britannia House, Banbury
Shaw, John...Huntsbury Hill, Northampton
Shaw, Rev. M...Rougham Rectory, Bury St Edmund's
Shaw, William...Cold Norton, Stone, Staffordshire
Shaw, William...Far Coton, Northampton
†Shawe, R. F....Brantingham Hall, Hull
Shawe, Samuel Pole...Maple Hayes, Lichfield
Shearer, B. P....Swanmore House, Bishop's Waltham
Sheffield, Earl of...Sheffield Park, Uckfield
Sheffield, Sir R., Bt....Normanby, Brigg, Lincolnsh.
†Sheild, W. H....Landawke, Langharne, Carmarthen
Sheldon, H. J....Brailes House, Shipston-on-Stour
Sheldon, John...Western Hill, Durham
†Sheldon, Jonathan...Ensham, Oxford
Sheldrake, E....Ixworth, Thorpe, Bury St. Edmund's
Shepherd, Edw....Bovington Farm, Wool, Wareham
Sheppard, J. G....Ashe High Ho., Wickham Market
†Sherard, P. C....Glatton, Stilton, Hunts
Sherborn, Francis...Bedfont, Middlesex
Sherborn, Francis, jun....Bedfont, Middlesex
Sherbrooke, H. Porter...Oxton, Southwell, Notts
Sheridan, R.B., M.P....Frampton Ct., Dorchester, Dor.
Sherrard, Jas. Corry...Kinnersley Manor, Reigate
Sherriff, William...Treworgan, Llangarren, Ross
Shingler, Hugh...Hopesay, Aston-on-Clune, Salop
Shittler, John...Elston, Devizes
Shittler, Wm. Rowden...Bishopstone, Salisbury
Short, Thomas...Martin, Bawtry
Shorten, Chas. Thomas...Ipswich
†Shubrick, Maj.-Gen....The Grove, Leatherhead
†Shuter, James...Crookham, Newbury
†Shuttleworth, Joseph...Newland House, Lincoln
Sibley, R....Annable's Farm, Harpenden, Herts
Sibthorpe, Major, M.P... Canwick House, Lincoln
Sidney, S ...St. Alban's Cottage, Northend, Fulham
Sikes, John...Sudbury, Suffolk
Sill, Rev J. P....Witheringsett Rectory, Stoneham
Sills, William...Casthorpe, Grantham
†Sillifant, John...Coombe, Copplestone, Devon
Silver, Rev. F....Norton-in-Hales, Market Drayton
Simcoe, Rev. H. A....Penheale, Launceston
Simeon, Sir J., Bart....Swainston, Isle of Wight
Simmons, Thos....East Peckham, Tonbridge, Kent
Simon, James...Greenfield, Holywell, Flintshire
Simonds, W. Barrow...Abbott's Barton, Winchester
†Simonds, J. Cabourne...Fishtoft, Boston
†Simonds, Thomas...Marske, Redcar
Simpson, Alex....Teawig, Beauly, Inverness-shire
Simpson, Alexander...Bridgnorth
Simpson, Benjamin Soulby...Boston
Simpson, E. Thornhill...Walton, Wakefield
Simpson, H. Bridgman...Babworth, Retford, Notts
Simpson, John...Pyle Inn, Bridgend
Simpson, John...Pinner Park, Middlesex
Simpson, John...Pottersbury, Stony Stratford
Simpson, Joseph...Spofforth Park, Wetherby
†Simpson, Pinder...29, Saville Row, W.

Simpson, Rich....The Cliffe, Douglas, Isle of Man
Simpson, S. W....North Laiths, Rufford, Ollerton
Simpson, Thos....High Street, Lincoln
Sims, W. Dyllwyn...Ipswich
Sinclair, John...Glenurquhach, Inverness
Sisson, John...Plascock, St. Asaph
Sisson, Robert James...Talardv, St. Asaph
Sitwell, Rev. H. W....Dunchurch
Sitwell, Robert Sacheverill...Merley, Derby
Skelton, Spencer...Sutton Bridge, Wisbeach
Skelton, W...Sutton Bridge, Long Sutton, Lincolnsh.
Skillicorne, W. Nash...Cheltenham
Skipworth, W....South Kelsey, Brigg
Skirving, William...15, Queen Square, Liverpool
†Slade, A F....Kemmal House, Chislehurst
Sladen, Joseph...Hartsbourne Manor, Bushey Heath
Sladen, St. Barbe 14, Parliament Street, S.W.
Slaney, W. H... Hatton Grange, Shiffnall
Slater, Cyrus . Dunkirk, Holmes Chapel
Slater, George.. Little Waldon, Saffron Walden
Slater, Martin ..Weston Colville, Newmarket
Slator, Thomas . Market Place, Boston
Slatter, William...Stratton, Cirencester
Sleigh, Holmes...Ellerton Grange, Newport, Salop
Sly, Wm. Walter...West Haddon Lodge, Rugby
Smallbones, G. B....Sternickel & Lintenia, Vienna
Smallpiece, Job.. Compton, Guildford
Smart, G....Woodhouse Grange, Aberford, Milford
Smart, Major George John ..Tumby, Boston
Smart, William Lynn.. Linden, Woburn
Smedley, C. E B... The Grange, Revesby, Boston
Smijth, Sir William Bowyer, Bt ...Hill Hall, Epping
†Smith, Abel...Woodhall Park, Hertford
Smith, Apsley ..Baxterley Hall, Atherstone
†Smith, Augustus...Ashlyns Hall, Berkhampstead
Smith, Charles Edward...84, Eccleston Square
†Smith, Sir Chas. Cunliffe W... Suttons, Romford
Smith, Charles H. ..Foxhole Colliery, Swansea
†Smith, C. R....Southrop Ho., Fairford, Gloucesters
Smith, D., jun....Martley Hall, Wickham Market
†Smith, Edw....Ratcliffe-on Trent
†Smith, Edward James...14, Whitehall Place, S.W
Smith, Felix...Upton Bishop, Ross
†Smith, George...The Luham, Penrith
Smith, Graham...Easton Grey Hall, Malmesbury
Smith, G. P.. .Lower Eaton House, Hereford
Smith, Geo. Robt....Selsdon Park, Croydon
Smith, Henry Abel...Welford, Nottingham
Smith, Henry...Drax Abbey, Selby, Yorkshire
Smith, Henry Trefusis...Devonport
Smith, Hen...New House, Sutton Maddock, Shiffnal
Smith, Henry...Brierly Hill, Dudley
Smith, Hugh...Pudlicott House, Enstone, Oxon
Smith, James ..Stanstead, Chichester
Smith, Jeremiah...Springfield, Rye
Smith, J. A....Bradford Peverell, Dorchester
Smith, J. Metcalf...Leeds
†Smith, John...Welton Garth, Hull
Smith, John...Fradswell Hall, Stone, Staffordshire
Smith, John...Crownthorpe, Wymondham
Smith, John...Marton Lodge, Bridlington
Smith, John...Sevenhampton, Andoversford
†Smith, John James...Down House, Blandford
Smith, John Kennedy...Radbrook Villa, Shrewsbury
Smith, John Philip...Wick, Worcester
Smith, Rev. John Tetley...Repton, Burton-on-Trent
Smith, John T....Thornby Grange, Guilsborough
Smith, Joseph...Henley in-Arden
Smith, Martin T., M.P....13, Upper Belgrave St.S.W.
Smith, M. Parker...Cefn Isla, Usk, Monmouthshire
Smith, Richard Booth...Huxley Farm, Edmonton
Smith, Robert...Heath Farm, St. Alban's
Smith, Robert...Emmett's Grange, South Molton
Smith, Robert Thursfield...Whitchurch, Salop
Smith, Thomas Robert...Shareshill, Wolverhampton
Smith, Thomas...Colebrook Park, Tunbridge
Smith, Rev. S....Lois Weedon Vicarage, Towcester
†Smith, Sir Wm., Bt....Eardiston House, Worcester
Smith, William...West Rasen, Spital, Lincolnshire
†Smith, William...Winchcomb, Gloucestershire
†Smith, William...Bibury, Fairford
Smith, William...Littlehales, Newport, Shropshire
Smith, William...Kettering
†Smith, W. B....Ranelagh Villas, Leamington
Smithers, William...Sondes Place Farm, Dorking
Smyth, James...Peasenhall, Witham
†Smyth, John George...Heath Hall, Wakefield
Smyth, William...Little Houghton, Northampton
Smyth, Rev. William...South Elkinstone, Louth
†Smythies, Carleton...Roman Hill, Colchester
†Smythies, George...Leintwardine, Salop
†Snell, John F....Great Bardfield Lodge, Braintree
Snewing, Charles...Watford
†Snoulten, Osborne...Woodville Hall, Dover
Snow, Rev. George D'Oylev...
Snowdon, William...Longford, Gloucester
Soames, Daniel W....Pinner, Watford
Somerset, J., M.D...Manor House, Milton, Pewsey
†Somerville, J C....Dinder Ho., Wells, Somersetsh
Souley, W....Kirby Moorside, Yorkshire
Sowerby, Francis...Aylesby, Great Grimsby
Spain, George...Hackling, Sandwich
Spanton, Robert...Little Thorns Farm, Swaffham
Spark, William...Shilton House, Coventry
Sparke, Alfred...Thorn Lane Foundry, Norwich
†Sparks, William...Crewkerne
Speakman, Thomas...Doddington Park, Nantwich
Spearing, John B....Moulsford, Wallingford
Spearing, William...Kennett, Marlborough
Spearman, H. J....Burn Hall, Durham
Spencer, Capt....Distington, Whitehaven
Spencer, Earl...Althorp, Northampton
Spencer, Edward ..Bircher, Leominster
Spencer, Francis...Claybrooke, Lutterworth
Spencer, J W., jun....Whorlton Hall, Newc.-on-T.
Spencer, Samuel...Snarestone, Ashby-de-la-Zouch
Spicer, J. William...Esher Place, Esher
Spill, George...Old Farm House, Stepney Green
Spinks, Abraham...West Bilney, Lynn
Spooner, Prof. C....Roy. Veter. College, St. Pancras
Spooner, Thomas...Burton-upon-Trent
Spooner, Richard, M.P....Birmingham
Spooner, William Charles...Southampton
Spragge, Francis Hoare,..Octon House, Torquay
Squier, Samuel W....Horndon on the Hill, Essex
Squire, Edward Fred....Cross Hall, St. Neots

table, Robert Scott...The Park, Wanstead
Stables, W. A....Cawdor Castle, Nairnshire, N. B.
tacy, Wm....West St. Helen's, Abingdon
tainton, John...Dalby, Spilsby
tallard, Jos....Redmarley, Newent, Gloucestersh.
Standish, W. Standish...Duxbury Park, Chorley
tane, John Bramston...Forest Hall, Ongar
tanford, Walter...Parham, Storrington, Sussex
tanford, W., jun....Steyning Court Farm, Steyning
Stanhope, J. B., M.P....Reresby Abbey, Horncastle
tanier, J. E...Uppington, Wellington, Salop
taniforth, Rev. Thos....Storr's Hall, Windermere
tanley, Edward...14, Grosvenor Square, W.
Stanley, Lord, M.P....Knowsley, Prescot
tanley, Henry...Upton, Shiffnall
tanley, W. H. S., jun....21, Curzon St., May Fair, W.
Stansfeld, H. Hamer...10, Basinghall Street, E.C.
Stansfield, W. R. C....Eshott Hall, Leeds
Stark, Michael J....Duke's Palace Bridge, Norwich
Starkey, Major L. C....Wrenbury Hall, Nantwich
†Starkey, J. Bayntun...Spye Park, Chippenham
Starmer, Chas....Hogsthorpe Rectory, Alford, Linc.
Statham, Rev. R. J....Rectory, Tarporley
Stawell, Col. A... Kilbrittain, Bandon, Cork
Stearn, Samuel G....Brandestone, Wickham Market
Statter, Thomas...Knowsley Hall, Bury, Lancashire
Stead, Titus Bennett...Leeds
†Stedman, Ja....Lucton, Leominster
Stedman, Robert...Great Bookham, Leatherhead
Stedman, Wm....Bedstone Hall, Aston, Shrewsbury
Steedman, Joseph...Meriden, Coventry
Stenning, Edward...Stratton House, Godstone
Stenning, William...Halsford, East Grinstead
Stenton, Henry Cawdron...Southwell
Stephens, Charles...Earley Court, Reading
Stephens, E....Trewornan, Wadebridge, Cornwall
Stephens, Rev. Ferd. T....St. Mawgan, Cornwall
Stephens, H L....Tregenna Castle, Hayne, Cornwall
Stephens, J....23, Eastbourne Terr., Hyde Park, W,
†Stephens, Robert...Ive's Place, Maidenhead
Stephens, S. J....5, Charlotte Street, Portland Place
Stephenson, Marshall...Fourstones, Hexham
Sterriker, John...Driffield
†Stevens, John...Holywell Street, Oxford
Stevens, J. Curzon Moore...Winscott, Torrington
†Stevens, Rev. T....Bradfield Rectory, Reading
Stevens, William Carr...Marsh Lane, Walthamstow
†Stevenson, Capt. C. B....Hennor House, Leominster
Steward, A. Benn...Chapel House, Whitehaven
Steward, Charles...Thurleston Lodge, Ipswich
†Steward, Chas ...Blundeston, Lowestoft
Stewart, A ...Barton House, Gloucester
Stickney, William...Ridgemont, Hull
Stilgoe, Henry...Chapel Ascot, Southam
Stillwell, J. J. R....Fairfield, Chiddingfold, Surrey
†Stirling, William, M.P....Keir House, Perthshire
Stobart, John H....Wilton-le-Weir, Darlington
Stock, S....Blackley Hurst, St. Helen's, Lancashire
Stocker, J. P....93, Oxford Terrace
Stokes, Charles...Kingston, Kegworth, Derby
Stone, John S....Newport, Monmouthshire
Stone, N. Chamberlain...Aylestone Hall, Leicester
†Stoneham, Frederick...Crayford
Stonehewer, W. S., jun....Brunswick Terr., Brighton
Stopford, W. Bruce...Drayton House, Thrapstone
Storer, C., M.D....Lowdham Grange, Nottingham
Story, J. B....Lockington Hall, Derby
Stow, Arthur...Bredon, Tewkesbury
†Stowey, Augustus...Kenbury House, Exeter
†Stracey, Henry J....Rackheath Hall, Norwich
Strachan, J. M....Teddington Grove, S W.
Strafford, Henry...13, Euston Square, N.W.
Strangway, Henry Bull...Shapwick, Bath
Straw, Fred....Stones Place, Skellingthorpe, Linc.
Strathallan, Visc....Strathallan Castle, Auchterarder
Stratton, George...Spinnymoor House, Durham
†Stratton, J. Locke...Turveston House, Brackley
Stratton, Richard...Broad Hinton, Swindon
Strelly, Richard Clayton...Buckland Hollow, Belper
Streeter, William...Sanderstead, Croydon
Strickland, Walter...Cokethorpe Park, Witney
†Strickland, Chas. William...Boynton, Bridlington
Strode, Geo. S....Newnham Park, Plympton, Devon
Stronge, Thomas...Cirencester
†Stuart, Lt.-Col. Wm., M.P....Kempston, Bedford
Stubbes, Walter...Beckbury, Shiffnall
Stubbs, Chas....Preston Hill, Penkridge
Stubbs, John...Weston Hall, Stafford
Stuckey, H....Drayton, Curry Revell, Taunton
Sturgeon, Charles...South Ockenden Hall, Romford
Sturgess, Thomas...Penshurst, Tunbridge
†Sturt, Hen. Chas., M.P....46, New Bond Street, W.
Stutfield. W....Hildersham Rookery, Cambridgesh.
Suffolk, Earl of...Charlton, Malmesbury
Summers, G....Winterborne Houghton, Blandford
Sumner, Rev. C. V. H....Ringwould Rectory, Dover
Surman, J. Surman.. Swindon Hall, Cheltenham
†Surtees, Henry Edward...Dane End, Ware
Surtees, Robert L ...Redworth House, Darlington
†Sutherland, Duke of...Trentham Park, Newc.-u-L.
†Sutton, John...Moston Manor, Sandbach
†Sutton, Martin Hope...Portland Place, Reading
Swaffield, Benj....Pilsbury, Ashborne, Derbyshire
Swaffield, Samuel...Ampthill Park, Bedfordshire
Swale, William...Town Hall, Leeds
Swan, W. R....Walls' End, Newcastle-upon-Tyne
Swann, George...York
†Swete, John B....Oxton House, Exeter
Swinburne, T. W....Winchcomb, Gloucestershire
Swinnerton, Robert...Weddington, Nuneaton
Sworder, H....Hallingbury Hall, Bishop Stortford
Sworder, J....West Mill, Bury, Buntingford, Herts
Sworder, William...Tawney Hall, Romford, Essex
Sydney, Viscount...Frognal, Footscray, Kent
Sykes, Edmund...Mansfield Woodhouse, Notts
Sykes, John...Croes Howell, Wrexham, Denbighsh.
†Sykes, Sir Tatton, Bart....Sledmere, Malton
Symonds, Thomas Powell...Pengethy, Ross
Symonds, Thomas George...Mynde Park, Ross
†Synge, Francis Hutchinson...Dysart, co. Clare

T.

Tabley, Lord de...Tabley House, Knutsford
Tabrum, Litchfield...Boishall, Brentwood
†Talbot, Henry...Cockfield Hall, Sudbury

Talbot, C R M, M P   Margam, Glamorganshire
Talbot de Malahide, Lord . Malahide Cas., Dublin
Talbot, Wm   Lane House, Burton, Westmoreland
Talbot, Wm H   Scarisbrooke Hall, Ormskirk
Tallant, Francis . Bushey Grove Farm, Watford
Tanner, Henry   South Hill Farm, Southmolton
Tanner, Joseph   Mudeford House, Christchurch
†Tanner, William   Patcham, Brighton
Tanton, T   Hill Farm, Torrington, Devon
Tasker, William   Waterloo Iron Works, Andover
Tattersall, E   1, Tattersall's Yd, Grosvenor Pl, S W.
Tattersall, John . Great Ealing, W
Tatton, T W   Wythenshawe Hall, Manchester
Taunton, William   Redlynch, Salisbury
Tawney A R   Banbury
†Taylor, Chas H   Bamburgh Friars, Belford
Taylor, Frederick   Worcester Park, Ewell
Taylor, F M S   Castle Taylor, Ardrahan, Galway
Taylor George   Dudley, Staffordshire
†Taylor, George Edward   Oatlands Leeds
Taylor James   Stretford Court Leominster
†Taylor J   Burnfoot House Wigton, Cumberland
Taylor John   Moreton Hall, Whalley, Blackburn
Taylor John   Aston Clinton, Tring
†Taylor Joseph   Bishop's Stortford
Taylor Mark   Cleeve, Goring, Reading
†Taylor R   6, Queen St Pl, Upper Thames Street
Taylor R P   Adelaide Pl, London Bridge, E C,
†Taylor, Sam   Eccleston Hall Prescot, Lancashire
†Taylor, S W M P   Erchfort Manor Ho, Devizes
Taylor Thomas   Burleigh Villa Wellington, Salop
Taylor, T Loombe   Starston, Harleston, Norfolk
Taylor, W   Showle Court Stoke Edith, Hereford
Taylor, William   Pool House, Groby, Leicester
Taylor, William   Thingehill Court, Hereford
Tayton William   Syderstone, Fakenham
†Tempest C Henry   Broomlands Nantwich
Tempest F Roger   Ackworth Grange, Pontefract
Tempest Sir C   Broughton Hall, Skipton, Yorkshire
Temple Edward   Saltergill, Yarm, Yorkshire
†Templemore, Lord   Dunnoby Pk, Wexford Ireland
Templeton, Andrew   Lismanny, Ballinasloe
Tench, John   Ludlow, Salop
Tennant, John   Riddings Long Preston, Leeds
Tennant, Joseph Mason   Headingley, Leeds
Tennant, J R   Kildwick Hall, Skipton, Yorkshire
Tennant, Thomas   Blenheim Terrace, Leeds
Terry, Rev Stephen   Dummer, Basingstoke
Thackeray, Capt   Junior United Serv Club, S W
Thackwell, John Cam   Dymock, Gloucestershire
†Thew, Edward   Lesbury House, Alnwick
Thomas, David   Brecon
Thomas, Edward   The Farm Bledfa, Radnorshire
Thomas E David   Wellfield House Builth, Brecon
Thomas F H   Hereford
Thomas, George   18, Redcliff Street, Bristol
†Thomas G T.   Ermatingen, Thurgovie, Switzerl
Thomas, John   Bletsoe, Bedford
Thomas L H   Caerffynnon, Talsarna Carnarvon
Thomas R Goring   Llysnewydd, Carmarthen
Thomas, Rees   Dolellan, Llandyssell, Carmarthen
Thomas, Thomas   St Hilary, Cowbridge
†Thomas, Rev W. J..   Llan Thomas, Hay, Herefordsh
Thomasson, William . Barnby Moor East Retford
Thompson, Alexander   Kirknewton, Wooler
Thompson, Andrew   Keele, Newcastle under-Lyne
Thompson, Anthony   Cross, Whitehaven
Thompson, G A   Kirkhouse, Brampton, Cumber
Thompson, Henry A   Lewes
Thompson, John   Paston, Coldstream
†Thompson, John   Badminton, Chippenham
Thompson, John B   Anlaby, Hull
Thompson, Matt   Kirkby Stephen, Westmoreland
Thompson, Leonard   Sheriff Hutton Park, York
Thompson, W   12 Dunsford Place, Bathwick, Bath
Thompson, William   Weymouth
Thompson W, jun   Thorpe le Soken, Colchester
Thomson Guy   Old Bank Oxford
Thomson, R J.   Grange, Kilmarnock
Thorn James   Brackinburgh Penrith
Thornes Joseph   Green House Ossett Wakefield
Thornhill, George   Diddington Huntingdon
Thornhill Obadiah   Barthomley, Crewe
†Thornhill T   Riddlesworth Hall, Thetford
Thornhill Wm Capel Clarke   Rushton, Kettering
†Thornhill W P, M P   Stanton Hall, Bakewell
Thornton C George   Marden Hill, Hertford
Thornton Harry   Turvey, Newport Pagnell
†Thorold Richard   Weelsby Hall, Grimsby
Thorpe, R H   Temple Selby
†Thorp Thomas   Alnwick, Northumberland
†Thorp Arch T   Kemerton Rectory, Tewkesbury
Thorpe J Cole   Otley Ho, Walesby, Market Rasen
†Thorpe John   Market Bosworth Hinckley
Thoyts Mortimer G   Sulhampstead House Reading
Thresher F Rich   Marsh Ho Bentley Farnham
Thring, Robert   9 Whitehall Place, S W
†Throckmorton Sir R G Bt   Buckland Faringdon
†Thurlow, T Lyon   Baynard Park Guildford
†Thurnhall, Henry   Royston, Herts
Thursby, Rev F   Abingdon Rectory Northampton
Thynne F George   Ileaford Lodge Guildford
Tiffen Joseph   North Skirlaugh Hull
†Tighe, Rt Hon Wm F   Inistioge, Ireland
Tilden John   Ifield Court Gravesend
†Tillard Philip   Great Stukeley Hall Huntingdon
Timm, Joseph   Champion Hill Camberwell, S.
Timmis, Richard   Darlington St, Wolverhampton
Tindall, Frederick   Preston Faversham
Timson, Rev Edward   Tachbury, Southampton
Tinkler, Robert   Penrith
Tinne, John A   Briarley, Aigburth, Liverpool
Tippler, Wm, jun   Roxwell, Chelmsford
†Todd, John   Mireside Wigton Cumberland
†Tollemache, H B   Junior United Service Club
Tollemache, J M P   Tilston Lodge, Tarporley
Tombs, J King   Lanford Lechlade
Tomkinson William   Newcastle, Staffs
Tomlin, H Currer   Easthampstead Wokingham
Tomline Col G, M P   1, Carlton House Terrace
Tomlinson, Capt Frederick W   Leamington
Tomlinson, J Edward   Whitbach, Ludlow, Salop
Tomlinson, Wm   Biggins House Kirby Lonsdale
Tompson Edw C S   Dromenagh Iver Bucks
Tompson, H Kett   Witchingham Hall Norwich
Tompson, R James   Cowley Peachey, Uxbridge

Tomson, James   Barnt Green Bromsgrove
Tonge, Charles   Branston, Lincoln
Tonge, W , sen   Moranto Court Farm, Sevenoaks
Tooke, William   12 Russell Square W C
Toomer, G Edw   Hoaden House Ash, Sandwich
Toplis, James   Boxted Farm Colchester
Torr William   Aylesby, Great Grimsby
Toulson, John Parker   Skipwith Hall Selby
Tovey Robert   Fairford
Towell Samuel   Rutland House Newmarket
Tower Christopher T   Weald Hall Brentwood
Towgood Edward   St Neots Hunts
Townley, Rev Gale   Beaupre Hall, Wisbeach
Townsend G Barnard   The Close, Salisbury
Townsend, Hen   Rydinghurst Cranley Guildford
†Townsend Thomas   Hillmorton, Rugby
†Townsend Rev C G G   Hatfield Peverel
Townsend W H   Strontian House, Cotham, Bristol
Townshend Charles   Pulford Chester
Townshend G H   Stoney Stanton Hinckley
Traherne, G M   St Hilary Glamorganshire
Trebeck Thomas   Southwell
Treby Henry Hele   Goodamoor Plympton, Devon
Treby Paul Ourry   Goodamoor, Plympton Devon
Tredwell John   Leigham Court Brixton Hill
†Tredegar Lord   Tredegar Park Newport
Tredwell T   St John's Lodge, Upper Norwood
†Treherne Morgan   Gate House, Hurst Green
Trehonnais R F de la   Central Hill, Up Norwood
†Trench Henry   Cangort Park, Roscrea Ireland
Trench, W S   Essex Castle Carrickmacross Ireland
Trethewy Henry   Grampound
Trethewy, Henry, jun   Silsoe Beds
Trevelyan Sir W C Bt   Wallington, Newcastle on T
Trimmer Charles   Alton, Hants
Trinder Edward   Cirencester
Tripp Arthur S   Esgair Hall Shrewsbury
Trollop Sir J , Bart M P   Casewick Stamford
Trood, Edward   Matford House Exminster
Trotter Thomas   Bywell, Newcastle upon Ty
Trower, Capt I S   Stansteadbury, Ware
Trumper Edward   Nuneham Park Oxford
†Tryon T   Bulwick Wansford Northamptonshire
Tuck Rev G R   Blofield Norwich
Tuck Henry   Shirley Ringwood
†Tucker, Henry   Bourton Ho , Shrivenham Berks
Tuckett P D jun   33, Holford Sq King's Cross
†Tudor Geo S   Park House Ripley [illegible]
†Tull Henry   Crookham Newbury
†Tull, Richard   Crookham, Newbury
†Turnbull John George   2 Upton Park Slough
†Turnbull Rev T S   Blofield Norfolk
Turner E I F   St Peter's Iron Works Ipswich
Turner Fred   St Peter's Iron Works, Ipswich
Turner, George   Barton, Exeter
†Turner, Lieut Col F Henry   Gouray, Jersey
Turner, J Singer   Chyngton Farm, Seaford, Lewes
Turner J   Fen Place Worth, Crawley, Sussex
Turner J H   Little Horringer Bury St Edmund's
Turner Philip   The Leen, Pembridge, Herefordsh
Turner P Henry   Whitlocksworthy Kingsbridge
†Turner W Beckett   Penleigh House Westbury
†Turnor, Christopher, M P   Stoke, Grantham
Turnor Michael   Brereton Rugeley
Turvill, G   Manor Farm, East Shalford, Guildford
Tuxford Jos Shephard   Skirbeck, Boston
Tuxford, Weston   Boston
Tuxford William Weld   Boston
Tweddle, John   Askerton Castle, Cumberland
Twining T   [illegible] Hall, Wrightington, Wigan
Twitchell Thomas   Willington, Bedford
Tyacke, James   Bonallack Constantine, Cornwall
Tylden Lt Col Sir J   Milsted, Sittingbourne
Tyler John   Layton Essex
Tyler Rev R T   Llantrithyd, Cowbridge
Tyrell, Sir J T Bart   Boreham Ho Chelmsford
Tyrrell John   New Court Topsham Devon

U

Umbers Abraham   Weston Hall, Leamington
†Umbers Edward   Wappenbury Leamington
Umbers Samuel   Wappenbury, Leamington
†Umfreville S C   Ingress Abbey Greenhithe
†Underwood Joseph   Blackheath Park, S E.
Unsworth John   The Thorn Penrith
Unthank John   Netherules Penrith
†Upperton Robert   35 Steyne Brighton
†Upton Hon Col G F   27 George St Hanover Sq W.
Upton H jun   Aldwick, Bognor Sussex
Upward A   30 Duncan Terrace Islington
Ursell Edward   Felton Ludlow Salop
†Usedom the Baron von   Berlin

Vasey Thomas   Stratton Cirencester
Vaisey, George De Horne   Halstead Essex
Vallance James   Hurstpierpont
†Vall Conde Del   Vergana Guipoisea Spain
Vallentine, R   Burcott Lo Fm Leighton Buzzard
Valpy Robert Harris   Enborne Newbury
Vanderstegen W H   Cane End House Henley
†Vane Rev John   Dulwich
Varnell G W   R V College, Camden Town, N W
Vaughan H Gwyn   Cynghordy Llandovery S W
Vaughan, John W   Velin Newydd House Brecon
†Vaughan, Nash V E   Rheola Neath Glamorg
Vaughan, William Brettell.   Ludlow
†Vaux Lord of Harrowden   Highams, Bagshot
†Vavasour Sir H M   Ickwell Bury Biggleswade
Veitch Jas , jun   Exotic Nurseries Chelsea S W
†Vere, John   Carlton upon Trent Newark Notts
†Verney Sir H Bt , M P   Claydon House Winslow
†Vernon Hon A H   Sudbury Derby
Vernon, G H   Grove Hall East Retford, Notts
Vernon Hon & Rev J V   Nuttall Rec Nottingham
Verrall, Richard Relfe   New Hall, Hurstpierpont
†Vevers, Charles   Ivington Park, Leominster
Vevers J Brace   Yarkhill Court Ledbury
Viall King   Stoke Clare Suffolk
Vickers Thomas   Ardwick Green Manchester
†Vickers V   Ellerton Grange Newport, Salop
Villar, James   Charlton Kings, Cheltenham
Villiers Hon F W C   Welford, Northamptonshire
Vincent, H Wm   Thornwood Lodge, Kensington

Talbot, C R M, M P   Margam, Glamorganshire
Talbot de Malahide, Lord   Malahide Cas., Dublin
Talbot, Wm   Lane House, Burton, Westmoreland
Talbot, Wm H   Scarisbrooke Hall, Ormskirk
Tallant, Francis   Bushey Grove Farm, Watford
Tanner, Henry   South Hill Farm, Southmolton
Tanner, Joseph   Mudeford House, Christchurch
†Tanner William   Patcham, Brighton
Tanton, I   Hill Farm, Torrington, Devon
Tasker, William   Waterloo Iron Works, Andover
Tattersall, I   1, Tattersall's Yd, Grosvenor Pl, S W.
Tattersall, John   Great Ealing, W
Tatton, T W   Wythenshawe Hall, Manchester
Taunton, William   Redlynch, Salisbury
Tawney A R   Banbury
†Taylor, Chas H   Bamburgh Friars, Belford
Taylor, Frederick   Worcester Park Ewell
Taylor, F M S   Castle Taylor, Ardrahan, Galway
Taylor George   Dudley, Staffordshire
†Taylor, George Edward   Oatlands Leeds
Taylor James   Stretford Court Leominster
†Taylor J   Burnfoo House Wigton, Cumberland
Taylor John   Moreton Hall, Whalley, Blackburn
Taylor John   Aston Clinton, Tring
†Taylor Joseph   Bishop's Stortford
Taylor Mark   Cleeve Goring, Reading
†Taylor R   6, Queen St Pl, Upper Thames Street
Taylor R P   Adelaide Pl, London Bridge E C,
†Taylor, Sam   Eccleston Hall, Prescot, Lancashire
†Taylor, S W M P   Erchfort Manor Ho, Devizes
Taylor Thomas   Burleigh Villa Wellington, Salop
Taylor, T Loombe   Starston, Harleston, Norfolk
Taylor, W   Showle Court Stoke Edith, Hereford
Taylor William   Pool House, Groby, Leicester
Taylor, William   Thingehill Court, Hereford
Tayton, William   Syderstone, Fakenham
†Tempest C Henry   Broomlands Nantwich
Tempest I Roger   Ackworth Grange, Pontefract
Tempest Sir C   Broughton Hall, Skipton, Yorkshire
Temple Edward   Saltergill, Yarm, Yorkshire
†Templemore, Lord   Dunnoby Pk., Wexford, Ireland
Templeton, Andrew   Lismanny, Ballinasloe
Tench John   Ludlow, Salop
Tennant, John   Riddings Long Preston, Leeds
Tennant, Joseph Mason   Headingley, Leeds
Tennant, J R   Kildwick Hall, Skipton Yorkshire
Tennant, Thomas   Blenheim Terrace, Leeds
Terry, Rev Stephen   Dummer, Basingstoke
Thackeray, Capt.   Junior United Serv Club S W
Thackwell John Cam   Dymock, Gloucestershire
†Thew, Edward   Lesbury House, Alnwick
Thomas, David   Brecon
Thomas, Edward   The Farm Bledfa, Radnorshire
Thomas F David   Welfield House Builth, Brecon
Thomas I H   Hereford
Thomas, George   18, Redcliff Street, Bristol
†Thomas G T.   Ermatingen, Thurgovie, Switzerl
Thomas, John   Bletsoe, Bedford
Thomas L H   Caerffynnon, Talsarna Carnarvon
Thomas R Goring   Llysnewydd, Carmarthen
Thomas, Rees   Dolellan, Llandyssell, Carmarthen
Thomas, Thomas   St Hilary, Cowbridge
†Thomas Rev W. J   Llan Thomas, Hay, Herefordsh

Thomasson, William   Barnby Moor East Retford
Thompson, Alexander   Kirknewton Wooler
Thompson Andrew   Keele, Newcastle under-Lyne
Thompson, Anthony   Cross, Whitehaven
Thompson, G A   Kirkhouse, Brampton, Cumber
Thompson, Henry A   Lewes
Thompson, John   Paston, Coldstream
†Thompson John   Badminton, Chippenham
Thompson, John B   Anlaby, Hull
Thompson, Matt   Kirkby Stephen, Westmoreland
Thompson, Leonard   Sheriff Hutton Park, York
Thompson, W   12 Dunsford Place Bathwick, Bath
Thompson William   Weymouth
Thompson W, jun   Thorpe le Soken Colchester
Thomson Guy   Old Bank Oxford
Thomson, R J.   Grange, Kilmarnock
Thorn James   Brackinburgh Penrith
Thornes Joseph   Green House Ossett Wakefield
Thornhill George   Diddington Huntingdon
Thornhill Obadiah   Barthomley, Crewe
†Thornhill T   Riddlesworth Hall Thetford
Thornhill Wm Capel Clarke   Rushton Kettering
†Thornhill W P, M P   Stanton Hall Bakewell
Thornton, C George   Marden Hill Hertford
Thornton Harry   Turvey Newport Pagnell
†Thorold Richard   Weelsby Hall, Grimsby
Thorpe, R H   Temple Selby
†Thorp Thomas   Alnwick Northumberland
†Thorp Arch T   Kemerton Rectory Tewkesbury
Thorpe J Cole   Otley Ho Walesby, Market Rasen
†Thorpe John   Market Bosworth Hinckley
Thoyts Mortimer G   Sulhampstead House Reading
Thresher F Rich   Marsh Ho Bentley Farnham
Thring, Robert   9, Whitehall Place, S W
†Throckmorton, Sir R G Bt   Buckland Faringdon
†Thurlow T Lyon   Baynard Park Guildford
†Thurnhall Henry   Royston Herts
Thursby, Rev F   Abingdon Rectory Northampton
Thynne F George   Fleaford Lodge Guildford
Tiffen Joseph   North Skirlaugh Hull
†Tighe, Rt Hon Wm F   Inistioge, Ireland
Tilden John   Ifield Court Gravesend
†Tillard Philip   Great Stukeley Hall Huntingdon
Timm, Joseph   Champion Hill Camberwell S.
Timmis, Richard   Darlington St, Wolverhampton
Tindall, Frederick   Preston Faversham
Timson, Rev Edward   Tachbury, Southampton
Tinkler Robert   Penrith
Tinne, John A   Briarley, Aigburth, Liverpool
Tippler, Wm, jun   Roxwell, Chelmsford
†Todd, John   Mireside Wigton Cumberland
†Tollemache, H B   Junior United Service Club
Tollemache, J M P   Tilston Lodge, Tarporley
Tombs, J King   Lanford Lechlade
Tomkinson William   Newcastle, Staffs
Tomlin, H Currer   Easthampstead Wokingham
Tomline, Col G, M P   1, Carlton House Terrace
Tomlinson, Capt Frederick W   Leamington
Tomlinson, J Edward   Whitbach Ludlow Salop
Tomlinson, Wm   Biggins House Kirby Lonsdale
Tompson Edw C S   Dromenagh Iver Bucks
Tompson, H Kett   Witchingham Hall Norwich
Tompson, R James   Cowley Peachey, Uxbridge

Tomson, James Barnt Green Bromsgrove
Tonge, Charles Branston, Lincoln
Tonge, W, sen Moranto Court Farm, Sevenoaks
Tooke, William 12 Russell Square W C
Toomer, G Edw Hoaden House Ash, Sandwich
Toplis, James Boxted Farm Colchester
Torr William Aylesby, Great Grimsby
Toulson, John Parker Skipwith Hall Selby
Tovey Robert . Fairford
Towell Samuel Rutland House Newmarket
Tower, Christopher T Weald Hall Brentwood
Towgood Edward St Neots Hunts
Townley, Rev Gale Beaupre Hall, Wisbeach
Townsend G Barnard The Close, Salisbury
Townsend, Hen .Rylinghurst Cranley Guildford
†Townsend Thomas Hillmorton, Rugby
†Townsend Rev C G G Hatfield Peverel
Townsend W H Strontian House, Cotham, Bristol
Townshend, Charles Pulford Chester
Townshend G H Stoney Stanton Hinckley
Traherne, G M St Hilary Glamorganshire
Trebeck Thomas Southwell
Treby Henry Hele Goodamoor Plympton, Devon
Treby, Paul Ourry Goodamoor, Plympton Devon
Tredwell John Leigham Court Brixton Hill
†Tredegar Lord Tredegar Park, Newport
Tredwell I St John s Lodge Upper Norwood
†Treherne Morgan Gate House, Hurst Green
Trehonnais R I de la Central Hill, Up Norwood
†Trench Henry Cangort Park, Roscrea Ireland
Trench, W S Essex Castle Carrickmacross Ireland
Trethewy Henry Grampound
Trethewy, Henry, jun Silsoe, Beds
Trevelyan Sir W C Bt Wallington, Newcastle on T
Trimmer Charles Alton, Hants
Trinder Edward Cirencester
Tripp Arthur S Isgair Hall Shrewsbury
Trollope Sir J Bart M P Caswick Stamford
Trood, Edward Matford House Exminster
Trotter Thomas Bywell, Newcastle upon Tyne
Trower, Capt L S Stansteadbury, Ware
Trumper Edward Nuneham Park Oxford
†Tryon I Bulwick, Wansford Northamptonshire
Tuck Rev G R Blofield Norwich
Tuck, Henry Shirley Ringwood
†Tucker, Henry Bourton Ho, Shrivenham, Berks
Tuckett, P D jun 33, Holford Sq Kings Cross
†Tudor, Geo S Park House Lapley Penkridge
†Tull Henry Crookham Newbury
†Tull, Richard Crookham, Newbury
†Turnbull John George 2 Upton Park Slough
†Turnbull, Rev T S Blofield Norfolk
Turner E R T St Peter s Iron Works Ipswich
Turner, Fred St Peter s Iron Works, Ipswich
Turner, George Barton, Exeter
†Turner Lieut Col I Henry Gouray, Jersey
Turner, J Singer Chyngton Farm, Seaford, Lewes
Turner J Fen Place Worth, Crawley, Sussex
Turner J H Little Horringer Bury St Edmunds
Turner, Philip The Leen, Pembridge, Herefordsh
Turner P Henry Whitlocksworthy Kingsbridge
†Turner W Beckett Penleigh House Westbury
†Turnor, Christopher, M P Stoke, Grantham
Turnor Michael Brereton Rugeley
Turvill G Manor Farm, East Shalford, Guildford
Tuxford Jos Shephard Skirbeck, Boston
Tuxford, Weston Boston
Tuxford William Weld Boston
Tweddle, John Aslerton Castle, Cumberland
Twining F [illegible] Hall, Wrightington, Wigan
Twitchell Thomas Willington, Bedford
Tyacke, James Bonallack Constantine, Cornwall
Tylden Lt Col Sir J Milsted, Sittingbourne
Tyler John Layton Essex
Tyler, Rev R T Llantrithyd, Cowbridge
Tyrell, Sir J T Bart Boreham Ho Chelmsford
Tyrrell John New Court Topsham Devon

U

Umbers Abraham Weston Hall, Leamington
†Umbers Edward Wappenbury Leamington
Umbers Samuel Wappenbury, Leamington
†Umfreville S C Ingress Abbey Greenhithe
†Underwood Joseph Blackheath Park, S E.
Unsworth John The Thorn Penrith
Unthank John Netherules Penrith
†Upperton Robert 3 Steyne Brighton
†Upton Hon Col G I [illegible] George St Hanover Sq W
Upton H jun Aldwick, Bognor Sussex
Upward A 36 Duncan Terrace Islington
Urwick Edward Felton Ludlow Salop
†Usedom the Baron von Berlin

V

Vaisey Thomas Stratton Cirencester
Vaizey, George De Horne Halstead Essex
Vallance James Hurstpierpont
†Valle, Conde Del Vergana Gurpois a Spain
Vallentine, R Burcott Lodge Leighton Buzzard
Valpy Robert Harris Enborne Newbury
Vanderstegen W H Cane End House Henley
†Vane Rev John Dulwich
Varnell G W R V College, Camden Town, N W
Vaughan H Gwyn Cynghordy Llandovery S W
Vaughan, John W Velin Newidd House, Brecon
†Vaughan, Nash V E Rhesta Neath Glamorg
Vaughan, William Brottell. Ludlow
†Vaux Lord of Harrowden Highams, Bagshot
†Vavasour Sir H M Ickwell Bury Biggleswade
Veitch Jas, jun Exotic Nurseries Chelsea, S W
†Vere, John Carlton upon Trent Newark, Notts
†Verney Sir H Bt, M P Claydon House Winslow
†Vernon Hon A H Sudbury Derby
Vernon, G H Grove Hall, East Retford, Notts
Vernon Hon & Rev J V Nuttall Rec Nottingham
Verrall, Richard Relfe New Hall, Hurstpierpont
†Vevers, Charles Ivington Park, Leominster
Vevers J Brace Yarkhill Court Ledbury
Viall, King Stoke Clare Suffolk
Vickers Thomas Ardwick Green Manchester
†Vickers V Ellerton Grange, Newport, Salop
Villar, James Charlton Kings, Cheltenham
Villiers Hon F W C Welford Northamptonshire
Vincent, H Wm Thornwood Lodge, Kensington

Vincent, James Clifton Maybank, Yeovil
Vivian, Lord Glynn, Bodmin
Vivian, George 11, Upper Grosvenor Street, W.
†Voile, Thomas Frolesworth, Lutterworth
Voss, Wm West Bucknowle, Corfe Castle, Dorset

W.

Waddingham J Guiting Grange, Winchcomb
Waddington John Horsey Langrish, Petersfield
Waddington, H S, M P Cavenham, Mildenhall
Wade, R 58 Upper Seymour St, Portman Sq W
Wade, R Craven Clonbranie, Crossakeile, Meath
Wagner, G H M 77, Marine, St Leonard s-on-Sea
Wagstaff Thomas West Ham, L
Wainman, W Bradley Carhead Crosshills, Leeds
Wainwright, C Rawlinson Shepton Mallet
Wakefield George Minworth Birmingham
Wakefield, John Sedgwick House, Kendal
Waldy, Edward Barmpton Darlington
Walker, D M Gloucester
Walker, Elisha Brereton, Sandbach
Walker, Frederick James Sandhutton, York
Walker, George Henry Newbold Grange, Rugby
Walker G J Alexander Norton, Worcester
Walker, James Northleach
Walker, John Westfield House, Holmer, Hereford
Walker, John Bradley Hall, Newcastle on Tyne
Walker John Deverell Nottingham
†Walker, John Mount St John Thirsk
Walker, John Newton Bank, Chester
Walker, John 15, Lonsdale Square, Islington
Walker, Joseph Need Calderstone, Liverpool
†Walker, Ormerod Oliver Bury Lancashire
Walker, Lawrence 12, Bryanston Square, W
Walker, Sir E S, Knt Berry Hill, Mansfield
Walker, Thomas Yanworth Northleach
Walker, Thomas Hall Cross House, Doncaster
†Walker, Wm H 38 Sackville Street London W
Wallace, John Houghton, Stockbridge, Hants
Waller, H S Farmington Northleach
Waller, Thomas Sutton Hall, Woodbridge
Wallington, George Wellesbourne, Warwickshire
Wallis, Arthur Basingstoke
Wallis, Edward Garrett Lane, Wandsworth, S W
Wallis, George Henton Waldridge, Faringdon
Wallis, O Overstone Grange, Northampton
Wallis, Samuel Barton Seagrave, Kettering
Walmsley, George Rudston, Burlington Yorkshire
†Walmesley, Richard Standerwick Court Frome
Walrond, J Walrond Bradfield, Collumpton
Walter, John Borden, Sittingbourne
Walter, Stephen West Farleigh, Maidstone
Walter William Rainham, Sittingbourne
Walters, William Haverfordwest
Walters John 10, Irongate, Derby
†Walters Thomas Albany Ho Old Kent Rd, S.
Warburton Rowland F F Arley Hall Northwich
Ward, David Iron Works, Melford, Sudbury
Ward G B Great Bentley, Colchester
Ward, John East Mersea, Colchester
Ward, Wm, Squire Wellow Hall, Ollerton, Notts
Ware, Jas Thomas. 51, Russell Square, W C

Waring, William . Chelsfield, Kent
Warman, Robert Idstone, Shrivenham, Berks
Warner, C Boreham 8, Crescent, Jewin St, E C
†Warner, George Priory, Hornsey, N
Warner, Henry, jun Hawkley, Petersfield
Warner, H J L jun Walsingham Abbey, Fakenham
Warner J Tixall Hall Farm, Gt Haywood, Stafford
Warner, Thomas 47, Sussex Square, Brighton
Warre, Henry 23, Chester Terr Eaton Sq, S W
†Warren, Rev J C B Horkesley Hall, Colchester
†Warren, R A Preston Place, Arundel, Sussex
Warry, George Shapwick Glastonbury
Warsop, John Alconbury Hill, Huntingdon
Warter, H de Grey Oruch Meole Ho, Shrewsbury
Wartnaby, John R Clipston Northamptonshire
Wason, Rigby Covwor, Girvan, Ayrshire
Waterhouse, Samuel Halifax
Waterpark Lord Doveridge Hall, Uttoxeter
Waters, Edward Stratford Sub Castle Salisbury
Waters, John Eastbourne
Waters, Robert Saman Carmarthen
Waters, William Wighton, Walsingham, Norfolk
†Watkins, J G Woodfield, Ombersley, Worcester
Watkins, Col Lloyd V, M P Pennoyre, Brecon
Watkinson Wm . New Market Louth
Watney Daniel 26, Poultry E C
Watson Henry Londenthorp Grantham
Watson, Henry G 123, George Street, Edinburgh
Watson, John Kendal
Watson John Shirburn Castle Tetsworth
Watson R Huxham Dorsley Farm Totnes
Watson, Col Wm 31, Great Cumberland Pl W
Watt, Gibson J Wm Doldolowe Radnorshire
Watts T Copson The Priory, Wolston Coventry
Watt n, G B Hall Farm Longden, Shrewsbury
Way Lewis Spencer Grange Gt Yeldham Essex
Way, L A Alderbourne, Gerrard s Cross, Bucks
Wayne, I M Manor Ho S Warnborough Odiham
Webb Henry jun Chishill Hall Saffron Walden
Webb, John Horseheath, Cambridgeshire
Webb, Jonas Church Farm, Babraham, Cambridge
†Webb Richard James Calcot Place Reading
Webb, Samuel Babraham Cambridge
Webb Thomas Hildersham, Cambridge
Webb Theodore Vincent Caxton, Cambridge
Webb Wm D. Haselor, Tamworth
Webb Wm Frederick Sion Hill Thirsk
†Webber, Charles Henry Buckland, Barnstaple
Webber, Thos Halberton Court Tiverton
†Webster, Charles Cowley, Uxbridge
Webster, F Marley Farm Battle Abbey, Sussex
Webster, James Peakirk Market Deeping
Webster, Capt P C G Hill Parsonage, Coldfield
†Webster, Wm Bullock
Wedd, Octavius Foulmire Royston
Wedgwood, Geo Arthur Warlingham, Croydon
Wedgwood, W R Heavitree Park Exeter
Weeks, Frederick Bolney Lodge, Cuckfield
Weir, Edward 142, High Holborn, W C
Weiss, F Bakeham House, Englefield Green
Welby, J Earle Allington Hall, Grantham
Welch, Henry T Leck Hall Kirkby Lonsdale
Welchman, Robert E . Southam, Warwickshire

Weld, E. J....71, Gloucester Place, Portman Sq., W.
Welfitt, W. Teale Manby Hall, Louth
Welford, R. G....Goff's Oak House, Cheshunt, N.
Wellington, Duke of ..Apsley House, Piccadilly, W.
†Wells, John...Armyn, Booth Ferry, Yorkshire
Wells, Thomas...Hampnett, Northleach
†Wells, William ..Redleaf, Penshurst
†Welsh, John...Kirkton, Hawick, N. B.
Welstead, Fred....The Cottage, Stonely, Kimbolton
Wemyss, J. Hay Erskine.. Wemyss Castle, N. B.
†Wenlock, Lord .Escrick Park, York
Wenman, Wm Henry.. Wiston, Shiffnall
Wentworth, Godfrey. Woolley Park, Wakefield
West, J. Robert...Alscot Park, Stratford on-Avon
West, J....Melton Ross, Brigg
West, Rev. Washbourne Lincoln College, Oxford
West, W. H.. Gliffaes, Crickhowell, Brecknockshire
†Westear, Henry.. Burwood Cottage, Esher, Surrey
†Western, Thomas Burch Felix Hall, Kelvedon
Western, T Sutton, M P. .Felix Hall, Kelvedon
Westhead, J P. Brown Lea Castle, Kidderminster
Wethered, George.. Maidenhead
†Weston, James, jun. Stoneleigh, Coventry
†Weyland, J .. Woodrising Hall, Hingham, Norfolk
†Whalley, Chas Lawson . Richmond Ho ,Lancaster
Wharton, Rev. J C ...Gilling Vic , Richmond, Yks.
†Wharton, J. Thomas Skelton Castle, Guisborough
Wharton, Rev W F Birmingham Rect., Winstow
Wheatley, John Neswick, Driffield
Wheble, James Joseph.. Bulmershe Court, Reading
†Wheeler, E. V.. Kyrewood House, Tenbury
Whibley, Jas William . St. Julian's, Sevenoaks
Whinyates, Maj -Gen C B R H Art , Woolwich
Whitaker, Joseph Ramsdale House, Nottingham
Whitaker, Joshua Bratton, Westbury
†Whitbread, Samuel Charles. 22, Eaton Place, S.W.
†White, Algernon Holt . Sewald's Hall, Harlow
†White, Henry .Warrington
†White, H Wm....Lentran House, Inverness, N. B.
White, James . Lindons, Coleford, Monmouthshire
White, J. A. .Cloatley, Hawkeston, Malmesbury
White, Rev J Chevington Rect , Bury St. Edmund's
Whitear, R B Martyr Worthy, Winchester
Whitehead, Charles ..West Farleigh, Maidstone
†Whitehead, Jeffery .2, Royal Exchange Buildings
Whitehead, J ...Barnjet, West Barming, Maidstone
Whitehead, John ..Preston
Whitehead, Richard ..West Farleigh, Maidstone
Whiteway, W. R... Kingsbridge House, Ashburton
Whiting, Charles.. Beaufort House, Strand, W C.
Whitley, Nicholas...Truro
Whitlock, F . Lovingtons, Gt. Yeldham, Halstead
†Whitmore, Thos....Apley Park, Bridgnorth, Salop
†Whitmore, Thos. C., M.P....Apley Park, Shiffnall
Whitmore, William...Wickham Market
Whitnell, John...Crick, Northamptonshire
†Whitting, Wm ...Thorney, Peterborough
Whittle, E....Toller Fratrum, Dorchester, Dorset
Whitworth, H B....Northampton
Whitworth, Joseph...Chorlton Street, Manchester
Whybro, Edward ..Tottenham Green, Middlesex.
†Wicks, John. Brackley Lodge, Walton-on Thames

†Wicksted, C....Thakenhurst, Cleobury Mortimer
Wickstead, Rev. Chas., B.A....Hafod, St. Asaph
Widdicombe, John...Treehill, Ivybridge, Devon
Wigan, E....Lapley Breewood, Wolverhampton
Wiggins, John...Tyndales, Danbury, Essex
†Wight, J. L ..Tedstone Ct , Bromyard, Hereford
Wightman, John ..Chard, Somersetshire
Wightwick, Thomas Norman.. Canterbury
Wigmore, John...Weston-under-Penyard, Ross
†Wilbraham, Hugh...Westport, co. Mayo, Ireland
Wilbraham, Randall...Rode Heath, Lawton, Cheshire
Wild, Samuel Bagnall ..Costock, Loughborough
Wild, T. M. . 3, Montague Terrace, Tonbridge Wells
Wilde, George. .9, New Square, Lincoln's Inn, W C.
Wiley, Samuel...Bransby, York
Wilkins, Henry...Westbury-on Severn, Gloucester
Wilkins, James ..Corse, Gloucester
Wilkinson, George H... Harperly Park, Durham
Wilkinson, H. John.. Walsham-le-Willows, Ixworth
Wilkinson, J S. ..Hungerford Ho., Madeley, Staffs.
Wilkinson, Joseph ..Roundhay, Leeds
Wilkinson, O. R. . Eaton Socon, Hunts
Wilkinson, Rev J. Breughton Gifford, Melksham
Wilkinson, Rev. P S....Mount Oswald, Durham
Wilkinson, T. Aytoun . Kingstandale, Buxton
Wilkinson, Capt. Thos. H. . Walsham, Ixworth
Wilkinson, William . Oxford
Willacy, Robert. .Penwortham Priory, Preston
Willett, John S....Petticombe, Torrington
Williames, J B....Glan Hafren, Garthmill, Montg.
Williames, Rev C .. Gedling Rectory, Nottingham
Williames, Chas. Crofts . Roath Court, Cardiff
Williams, David ..Kinmel Farm, St Asaph
Williams, Edward ..Celyn, Northop, Flints
Williams, Rev. Edward P Mount Balan, Chepstow
Williams, Fras. Edward ..Malvern Hall, Solihull
†Williams, G . Buckland, Faringdon
Williams, Sir Hugh, Bt Bodelwyddan, St. Asaph
†Williams, James Northcourt, Abingdon
Williams, Rev James ..Tring Park, Tring
Williams, John...Bank, Chester
Williams, John ..Alstone, Cheltenham
Williams, John. .Tynycellyn, Chirk
Williams, Philip.. Wednesbury Oak, Tipton
†Williams, R jun. ..Bridehead, Dorchester, Dorset
Williams, T Playfair. .20, King Street, St. James's
Williams, William.. Tregullow, Scorrier, Cornwall
†Williams, William ..Pentraeth, Anglesea, N W.
Williams, Wm....The Hill House, Walton, Ipswich
Williams, W. E ...Pwll-y pant, Cardiff
Williams, Rev. W J.. Glamorgan Street, Brecon
Williams, W. A....Llangibby Cas., Newpor , Monm.
Williams, W R....Dolgelly
†Williamson, H. ..Greenway Bank, Burslem, Staffs.
Willis, Joseph...Snoddington, Shipton, Marlborough
†Willich, Charles M....24, Suffolk Street, Pall-Mall
Willoughby de Broke, Ld...Compton Verney, Warw
†Willoughby, W....
Willsher, C. W....Weathersfield, Braintree
Wills, John...South Petherwyn, Launceston
Willson, Anthony, M.P....Ranceby Hall, Sleaford
Wilmot, Sir H. S., Bart....Chaddesdon Hall, Derby

Wilson, Chas R ...Hipsbourne, Alnwick
Wilson, Franers...Ludford, Market Rasen
Wilson, G. Edward...Dallam Tower, Milnthorpe
Wilson, Henry J....Sherwood Hall, Mansfield
Wilson, Jacob... Woodhorn Manor House, Morpeth
Wilson, Admiral John...The Howe, Windermere
†Wilson, Professor J... Iver, Bucks
†Wilson, J ..Edington Mains, Ayton, Berwickshire
†Wilson, John...Seacroft Hall, Leeds
Wilson, J. Hewetson ..The Grange, Worth, Sussex
Wilson, Matthew...Eshton Hall, Gargrave, Leeds
†Wilson, Richard...Bourton Grange, Much Wenlock
†Wilson, Richard Basset . Cliffe House, Darlington
†Wilson, T... Shortley Hall, Newcastle-upon-Tyne
Wilson, Thos, jun....20, Gloucester Sq , Hyde Park
†Wilson, Thomas Francis . Althorne, Maldon
Wilson, William...Baylham Hall, Ipswich
Wilson, William.. Berkhampstead
Wilson, William. Bulcote, Nottingham
†Wimbush, Barnes.. Finchley, N
†Winchester, Marquis of...Amport House, Andover
Winchelsea, Earl of...Eastwell Park, Ashford
Winder, E H Lyon .Vaenor Park, Shrewsbury
Wing, Thomas Twining ..Goldington, Bedford
Wingfield, John. Onslow, Salop
Wingfield, John M ...Tickencote Hall, Stamford
Wingfield, R. Baker.. 2, Lowndes Square, S W.
Winmill, S. P .Shopland, Rochford
†Winn, Roland Appleby Hall, Brigg
Winnall, John Eccleswall Court, Ross
Winnington, Sir T , Bt. ..Stanford Court, Worcester
Winstanley, J Beaumont .Braunston Ho ,Leicester
†Winterbottom, Jas. E. East Woodhay, Newbury
Winthrop, Rev. Benjamin .Clifton, Bristol
Wippell, John Lower Brenton, Kennford, Exeter
Wise, Henry Feltons, Brickham, Reigate
†Witney, William Hanover Street
Witherington, C. ..Bradfield, Reading
†Wodehouse, Lord Kimberley, Wymondham
Wodehouse, W H . .Woolmers Park, Hertford
Wollaston, Major F. Shenton Hall, Nuneaton
Wollen, Joseph. Wedmore, Somerset
Wolton, Samuel . Kesgrave, Ipswich
†Wombwell, Sir G , Bart ..Newburgh, Easingwold
†Wood, Rt. Hon. Sir C , Bart., M P....Doncaster
Wood, Maj Edward A... Osmington, Weymouth
Wood, Edward ..Hanger Hill, Middlesex
Wood, Col. Edward Robert...Stout Hall, Swansea
†Wood, George. Hatchlands, Guildford
Wood, George.. Rochford, Essex
Wood, George.. Graham's Town, Cape of Good Hope
Wood, Henry...Woodhill Send, Ripley, Surrey
Wood, James...Ockley, Hurstpierpoint
Wood, John ..Croham Farm, Croydon
†Wood, John...Sheddon Grange, Alton
Wood, John.. Stanwick Park, Darlington
Wood, Richard...Potternewton, Leeds
Wood, Rev R....Woodhall Park, Leyburn, Bedale
Wood, Maj.-Gen. Thomas...Littleton, Chertsey
†Wood, Western, M P....North Cray Place, Kent
Wood, William...Ifield Court, Crawley, Sussex
Wood, Willoughby...Holly Bank, Burton-on-Trent
Wood, W. Bryan...Branbridge, Chippenham
Woodd, B. T , M P....Conyngham Hall, Knaresboro'
Woodham, Rev. Thomas F....Farley, Romsey
†Woodham, W. Nash.. Shepreth, Melbourne, Camb.
Woodhams, W. R ...The Hammonds, Rye, Sussex
Woodhouse, John...Over Seale, Ashby-de-la Zouch
Woodman, Richard, jun....Glynde, Lewes
Woods, Edmund Freeman. .Stowmarket
Woods, Henry .Merton, Thetford
†Woods, James.. Stowmarket
†Woods, W. Leyland. .Chilgrove, Chichester
Woodward, Henry...Stanway, Colchester
Woodward, Joseph...Birlingham, Pershore
Woodward, Robert...Arley Castle, Bewdley
Woodward, Robert.. Rise Hall, Akenham, Ipswich
Woodward, Wm . Northway House, Tewkesbury
Woodward, Rev. W....Bidford Grange, Bromsgrove
†Woodyeare, Rev. J. F. W. Crookhill, Doncaster
Woollcombe, John M... Ashbury, Okehampton
Wooldridge, H... Meon Stoke, Bishop's Waltham
Woolf, Joseph . Haslington Hall, Crewe
Woolf, Thos. . Standon Hall, Eccleshall, Staffs.
Woolly, John . Sandbach
Woolley, T. S , jun .. South Collingham Newark
Woolnough, Wm. Kingston-on-Thames
Wooster, James ..The Wrestlers, Elstree, Herts
Worby, William Ipswich
Worsey, John ..Lower Clopton, Stratford on-Avon
Worsley, Chas Cavill . Platt, Manchester
Worsley, Lord, M.P . Brocklesby Park, Ulceby
Wortham, Biscoe Hill .Royston, Herts
Worthington, Archibald. .Whitchurch, Salop
Wortley, Edw ...Ridlington, Uppingham
Wratislaw, Chas Edward.. Woolscott, Rugby
†Wrench, Robert ..39, King William Street, E.C
Wrey, Sir Bouchier, Bart... The Chase, Ashburton
Wright, Edmund . Halston, Oswestry
Wright, Francis . Osmaston Manor, Derby
Wright, James...Ravenhill, Rugeley
Wright, John . The Terrace, Chesterfield
Wright, John Francis Kelvedon Hall, Brentwood
Wright, John. .Buxton, Norwich
Wright, Joseph .Harehills Lane, Leeds
Wright, Richard. Fieldbank, Macclesfield
Wright, Robert John.. Queen Street, Norwich
Wright, S. W. ..Grendon House, Castle Ashby
†Wright, Thomas...North Runcton, Lynn
Wright, Thos Barr.. The Quarry Ho , Great Barr
Wright, William...Sigglesthorne, Holderness
Wright, William .Fring, Rougham, Norfolk
†Wrightson, W. B., M P. .Cusworth Park, Doncaster
Wrinch, Samuel...Great Holland Hall, Colchester
Wroughton, Philip...Woolley Park, Wantage
Wyatt, Harvey...Acton Hill, Stafford
Wyatt, Hugh.. Cissbury, Worthing
†Wyatt, William ..Eyam, Bakewell, Derbyshire
†Wyley, James, jun ...Longdon, Rugeley
†Wyley, Wm....Vineyard, Wellington, Shropshire
Wyndham, Capt. Alex....West Lodge, Blandford
†Wyndham, J. E. ..Fairburn Ho , Acton Green, W.
Wyndham, J H C....Bishop's Waltham
†Wyndham, Wm....Dinton, Salisbury

Wynne, B Wynne . Garthewin Abergele Denbigh
Wynne, J Ll , jun Coed Coch, Abergele, Denbigh
Wynne, Wm W E Aberamfra, Barmouth
Wynniatt, R , jun Dymock Grange, Gloucester
†Wythes, George Reigate

Y.

Yates, Capt Yearand Conyers, Lancaster
Yeates J Y Park head, Levens, Milnthorpe
Yeo, Wm A Fremington House, Barnstaple
Yeoman, Thos Lawrence Weasenham, Rougham
Yonge, Rev. Wm J Rockbourne, Salisbury
Yorke, Hon Eliot T , M P Wimpole, Cambridge
Yorke, Joseph Forthampton Co , Tewkesbury
†Yorke, J L Halton Place, Hellifield, Leeds
Young A A Orlingbury Ho , Wellingborough
|Young, George 27, Mark Lane, City , E C.

Z

Zoeppritz, G. Ravensburg, Würtemberg, Germany

Honorary Members.

Daubeny, Professor Charles, F R S , University of Oxford
De Lavergne, M Leonce
Everett, Hon Edward, Cambridge University, United States
Graham, Professor, Master of the Mint
Hartstein, Dr. Edward, Royal Academy of Popplesdorf
Hofmann, Dr., College of Chemistry, 315, Oxford Street
Liebig, Dr. Justus, the University of Giessen, Hesse Darmstang
Murchison, Sir Roderick Impey, Bart , Director-General of Trigonometrical Survey
Napoleon III , His Imperial Majesty the Emperor of the French
Parkes, Josiah, 11, Great College Street, Westminster
Playfair, Dr. Lyon, C B , University, Edinburgh
Simonds, James Beart, Royal Veterinary College, Camden Town
Solly, Edward, Professor, Holme Court, Isleworth
Sprengel, Dr. Carl, Prussia
Van de Weyer, M Sylvian, Belgian Minister, 50, Portland Place
Voelcker, Professor, Royal Agricultural College, Cirencester
Way, John Thomas, 15, Welbeck Street

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